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THE NATIONAL HORTICULTURAL MAGAZINE

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Our Native Phloxes and Their Horticultural Derivatives*

EDGAR T. WHERRY

THE genus *Phlox* comprises about 50 species, all natives of North America, although one Alaskan species grows also in Siberia. Many of them produce attractive floral displays, and a few have found their way into horticulture. Showing as they do marked variability, as well as considerable intergradation between species, their taxonomy is difficult to work out, and many misunderstandings as to their relationships have arisen. Several names have come to be used by horticulturists in quite different senses than by taxonomic botanists, resulting in such confusion. During the past few years field and herbarium studies of these plants have been made, leading to the bringing of some degree of order out of this state of chaos, and the results of significance from the horticultural standpoint will be published here.

THE EASTERN NARROW-LEAVED PHLOXES (SECTION SUBULATAE)

In this section the stems are woody, trailing or decumbent, and often much branched, with latent shoots well developed in the leaf-axis at flowering time. The leaves are small, ranging from subulate to linear-lanceolate or rarely oblong in outline, and many are more or less evergreen. The inflorescence consists of a cyme of a few relatively long-pedicelled flowers. One member of this section, *Phlox subulata*, is widely used in rock gardens, but the other two, *P. nivalis* and *B.*

bifida, are not so well known as they deserve to be.

PHLOX SUBULATA L. MOSS PHLOX.

The dispersal-center of this species lies in the Appalachian mountain region of eastern West Virginia. From there the plant spread to upland North Carolina, central Kentucky, the Great Lakes region, and across New Jersey to Long Island. It has also escaped from cultivation in many places both within and beyond this range. Its usual habitat is a dry rocky or sandy slope, the soil-reaction varying from slightly alkaline to strongly acid, indicating essential indifference to this factor.

While the dominant corolla-color is phlox-purple, most colonies show marked variability in this respect, ranging from intense purple through intermediate light purple, rose, and lilac hues to pure white. Lavender or light violet colors are less frequent, but appear occasionally. The eye is often marked by a group of ten radiating striae, which vary both in hue and intensity, sometimes coalescing into a purple ring, and again becoming obsolete. Corolla-lobe outline varies from narrowly cuneate to broadly obovate, with a terminal notch up to 2 mm. deep; our figure represents a colony in New Jersey where two plants growing intermingled showed marked contrast in this respect. The calyx and pedicels are downy, and toward the northern side of the range the hairs are usually sharp-pointed, while toward the south they tend to be gland-tipped,

*Contribution from the Botanical Laboratory and Morris Arboretum of the University of Pennsylvania.

*Phlox subulata*

although there may be exceptions in both regions.

On December 10, 1745, John Bartram wrote to Peter Collinson in England that he was sending him "one sod of the fine creeping spring Lychnis," by which he meant the plant subsequently named by Linnaeus *Phlox subulata*. This is the earliest record we have of the introduction of the species into horticulture, a date which Farrer suggested "ought indeed be kept as a horticultural festival." It persisted in Collinson's garden, and was catalogued by him as "*Lychnidea sempervirens flore rubro*"—the evergreen false-lychnis with red flowers. From there it found its way into other gardens, but apparently received no particular attention for over a hundred years.

The first color-form to be picked out from its numerous variants and specially propagated was white with rose-purple eye-striae, the leaves being unusually broad; this was originated by J. G. Nelson in 1852 and

was duly named horticultural variety *nelsoni*. Many others have since been developed, the most popular in the United States being hort. var. *grandiflora*. This has a rather raucous magenta corolla-color, but is valued because of the relatively large size and abundance of its flowers. Hort var. *atropurpurea* has a more intense and redder color, but is less widely used. Some of the horticultural varieties produce viable seed, but others are sterile clones which must be propagated vegetatively. No attempt will be made to list them here, but a brief discussion may be given of the status of certain "specific" names often used in connection with this *Phlox*.

australis. A geographic variety, ranging from western North Carolina to southern Ohio, characterized by glandular hairs on the inflorescence-foliage.

brittonii. Originally described as a distinct species, but scarcely more than a variety, occurring in the Appalachians of Virginia and West Vir-

*Phlox nivalis*

ginia, and extending down the Potomac valley to the Fall-line. Differs from variety *australis* in having a somewhat smaller corolla of lavender to white color.

ciliata. The northern geographic variety, with the hairs normally glandless. The plants sent by Bartram to Collinson belonged here, and so accordingly do the horticultural varieties which arose from that original source.

nivalis. Sometimes applied to pure white forms of *P. subulata*, but these are preferably termed horticultural variety *alba*, since the name *nivalis* really belongs to the species discussed next.

setacea. This name was applied by Linnaeus to a depauperate fragment of *P. subulata*, and has no taxonomic standing. It is sometimes used in British horticultural writings in place of the accepted name for this species, and again for *P. nivalis*, but should be discarded.

stellaria. Although proposed by

Gray for a variety of another species (*P. bifida*), this name has come to be used for horticultural varieties of *P. subulata* with more or less star-like corollas. Such dual significance for a name is undesirable.

PHLOX NIVALIS LODDIGES. TRAILING PHLOX

Because of similarity in foliage, this Phlox has been confused with *P. subulata*, but they differ so markedly in their reproductive organs that they are to be regarded as distinct species. In *P. subulata* the stamens are so long that the anthers of several of them are visible at the corolla-tube orifice, and the style is also elongate. In the plant here under consideration even the longest stamen is normally deep within the corolla-tube, and the style is so short that the stigmas scarcely reach the level of the sepal-tips. The corolla, too, tends to be larger and paler in color, and its lobes more shallowly notched. The name *nivalis*,

*Phlox bifida*

which means snowy, was indeed applied to it because the flowers of the particular clump under observation were so white that a plant in full bloom looked as though snow-covered. The rule of priority requires that this name be used, even though it was later recognized that pink, rose, and purple color-forms also exist.

Phlox nivalis is more southern in range than its relative, its dispersal-center lying in the Piedmont of South Carolina and adjacent states. From there it has spread to the shores of Tampa Bay, in western peninsular Florida, to the sand hills of eastern Texas, and to the Piedmont of southern Virginia. It grows chiefly in acid soils on thinly wooded dry sandy slopes, or rarely in moist pineland. Stock obtained from the more southern portions of this range is not very hardy, but that from further north can stand temperatures of 15 to 20 degrees below zero without injury.

Two additional names often used for this species require discussion:

hantzii. Applied to this *Phlox* by Nuttall 11 years after the publication of the name *nivalis*; to be reduced to synonymy in accordance with the rule of priority.

setacea. In 1798 Curtis used this name by mistake for a cultivated clump of *Phlox nivalis*, which had been collected by Fraser in the Carolinas and sent to England 10 years before. Owing to the prestige of the Botanical Magazine, in which his plate appeared, his usage is followed by many British horticulturalists to this day. According to the rules of botanical nomenclature, however, *setacea* is an obsolete synonym of *subulata*, and does not apply at all to any other species.

HYBRIDS OF *P. subulata* AND *P. nivalis*
(\times *P. frondosa*)

Judging from the intermediate lengths of their stamens and styles, several cones commonly classed as horticultural varieties of *P. subulata* are the result of hybridization between

that species and *P. nivalis*. Since the earliest name applied to this cross was apparently *Phlox frondosa* Hort., such plants should be referred to it. The two most notable are:

× *Phlox frondosa* hort. var. *Vivid*. A plant of compact growth bearing an abundance of flowers of a lovely bright rose color.

× *P. frondosa* hort var. *Perfection*. A vigorous, spreading plant with large flowers which are pink with purple eye-spot.

PHLOX BIFIDA BECK. SAND PHLOX.

This is a plant of the interior, its range centering in southern Illinois, and extending from there to northern Arkansas, northwestern Oklahoma and perhaps adjacent Texas, northeastern Iowa, southwestern Michigan, central Kentucky and Tennessee. While the common name refers to the fact that it frequently occurs on sandy banks, it also grows on rocky slopes and even on bare cliffs. Thriving alike on limestone where the gravel is distinctly alkaline and in peaty sand where at least moderate acidity develops, it is to be classed as indifferent to soil reaction, and as adapted to cultivation in rather barren situations, at least where the soil is not clayey or compact.

The foliage of this species is rather different from that of the other members of the section, the leaves being fewer in number and considerably longer. Calyx and pedicels vary from densely hairy to glabrous, the hairs being usually gland-tipped in the more northern colonies. The corolla-color is normally paler and more violent than in the other species, ranging from white to lavender and rarely to lilac or rose. Some forms have the corolla lobes so deeply cleft that there appear to be ten instead of five petals,

although others resemble *P. subulata* in pattern.

Phlox bifida was discovered in Illinois and Kentucky about 1820, and was early brought into cultivation in wild flower gardens of that region. There is no record as to whom or by whom it was first sent to Europe, and it is apparently not extensively cultivated there.

The only name which requires discussion in connection with this species is *stellaria*. This was first used by Gray in 1870 for a specimen of *P. bifida* which was unusual in two respects, namely in having glabrous foliage and very shallow notches in the corolla-lobes. The colony in Kentucky from which it came has since been rediscovered, and the plant proves to vary from glabrous to moderately pubescent with non-glandular hairs. This plant is but little known in horticulture, and the name has come to be applied to various forms of *P. subulata* or to hybrids between it and *P. bifida*. To avoid confusion such names should be limited to material similar to that for which they were originally proposed.

HYBRIDS OF *P. subulata* AND *P. bifida* (× *P. lilacina* HORT.)

Clones variously known as *P. subulata* hort. vars. *lilacina*, *stellaria* and *G. F. Wilson* (or *wilsoni*) possess such large leaves and lavender-hued flowers that they are inferred to be hybrids of these two native species. The preferable form of the last name is × *P. lilacina* hort. var. *G. F. Wilson*.

THE EASTERN SHORT-STYLED PHLOXES (SECTION DIVARICATAE)

Four perennial species are comprised in this Section, although only one of these is extensively cultivated.

*Phlox divaricata*

The stems are herbaceous, and axillary shoots are inconspicuous; most of the moderately large leaves are deciduous, but a few may winter over. A number of rather short-pedicelled flowers make up the inflorescence, which is cymose or somewhat paniculate. The most important diagnostic character is the shortness of the stamens and styles, the longest stamen normally lying well below the corollatube orifice, and the ends of the stigmas but little surpassing the calyx-tube.

PHLOX DIVARICATA L. BLUE PHLOX.

There are two geographic varieties of this species; the eastern one, var. *canadensis*, has its dispersal center in Kentucky, and from there ranges to Georgia, to the western boundary of Indiana, to central Michigan and to northwestern Vermont. Variety *laphami*, the western representative, has spread out from the Ozarks to western Florida, eastern Texas, southern

Minnesota, and the east edge of Illinois. Both occur in deciduous woodland, in circumneutral soil, often on river flood-plains, but sometimes on steep slopes and even limestone cliffs. They are accordingly readily cultivated in rich garden loam.

As the common name implies, the corolla-color of this species often tends toward blue, although strictly speaking it should be termed light violet or lavender; and it occasionally ranges to lilac or light purple. Pallid and pure white forms are also frequently met with. The eye may be white or suffused with rose, although definite striae are rarely developed. Corolla-lobe outline varies markedly, but the two geographic varieties are distinguished chiefly on one feature of it; the eastern one usually has distinct notches in the ends of the lobes, while in the western one there are almost entire or mucronate instead. As to foliage characters, it may be noted that the crowns produce in summer prostrate sterile shoots which tend

*Phlox pilosa**Phlox floridana*

to persist through the winter, and that the upper herbage is somewhat viscid with gland-tipped hairs.

John Bartram is to be given credit for the introduction of this Phlox into horticulture, for while it was listed by Plukenet as early as 1700 (from "Virginia"), the preserved correspondence between Collinson and Bartram shows that the latter obtained it along the Susquehanna River presumably in Pennsylvania, and sent it to England, where it first bloomed on May 5, 1740. Linnaeus based the species on a plant cultivated in the botanical garden at Upsala, and it has found a place in European gardens ever since; more recently it has become popular also in America. No important horticultural varieties appear to have been produced, but some remarks are called for here as to the proper usage of the two varietal names already referred to.

canadensis. Often used in catalogs as though it were the species name, but this usage is not correct; should

be used instead to designate the variety of *divaricata* with notched corolla-lobes. No other diagnostic characters of the variety have been recognized, although its color on the whole tends more toward the purple or lilac side.

laphami. This is the varietal name which belongs to plants in which the corolla-lobes are entire or apiculate, rather than notched. The growth is often rather more vigorous, and the color more violet or lavender, or the eye more deeply colored, than in the first-named variety.

For albino forms the names *alba*, *albiflora*, and *candida* have all been used.

PHLOX PILOSA L. DOWNY PHLOX.

Starting from a dispersal-center in the Ozark region, this Phlox has attained a wider range than any other species, and has also become differentiated into a larger number of geographic varieties. It is abundant in

all of the states bordering on the Gulf of Mexico, and extends from central Texas north to the vicinity of Winnipeg, Manitoba, and from the Tampa Bay region in Florida northeast to Connecticut. Though perhaps most frequent in moist but rather sterile grassland, it also grows in open woods, and on rocky slopes, showing no particular preference as to soil reaction.

From *Phlox divaricata* the present species is distinguished by its failure to produce decumbent sterile sub-evergreen shoots, its linear to lanceolate leaf-outline (ranging in one variety to oblong or ovate), the frequent presence of pubescence on the outer surface of the corolla-tube, the lack of any tendency to notching of the corolla-lobes, and bright purple corolla-color, ranging to lilac and white only occasionally. The herbage may be densely pubescent with either glandless hairs, or in certain varieties nearly or quite glabrous. Though varying in scent as in most other characters, *Phlox pilosa* tends to be sweet-scented, and in some colonies is markedly so, the fragrance suggesting that of cloves or of jasmine.

Phlox pilosa is but little known horticulturally. It is said to have been first introduced into English gardens by John Fraser in 1806, and has been grown to some extent ever since, usually under the name *P. aristata*. In recent years a phase with pale lavender flowers and unusual vegetative vigor from the south shore of Lake Michigan, named by Clute and Farriss *P. argillacea* has been brought into cultivation on both sides of the Atlantic, and has received favorable comment and even medal awards. The status of these and other varietal names may now be considered.

amplexicaulis. A geographic variety from the Mississippi valley with

the herbage bearing coarse but eglandular hairs.

argillacea. Since the plant so-named does not differ in any respect of taxonomic significance from the original *P. pilosa*, the name should certainly not be given independent rank. Because of its horticultural value, however, it may be classed as *P. pilosa* hort. var. *argillacea*. Its distinctive features are pale lilac or lavender corolla-color, and long blooming-season.

aristata. Although widely used in horticultural literature this name has no taxonomic standing, since it was proposed by Michaux under a misapprehension as to the identity of *P. pilosa*, and is a simple synonym of the latter name.

detonsa. A geographic variety, characterized by its glabrous leaves.

fulgida. The Interior Plains variety, with the herbage lustrous-pubescent with glandless hairs.

ozarkana. A newly recognized variety occurring in the Ozark region, having large oblong or ovate upper leaves, and often a compound inflorescence of especially showy flowers. This deserves trial as to its horticultural value.

virens. The varietal name of the most wide-ranging representative of the genus. As this is the only variety found in the northeastern states, it is the one generally cultivated.

HYBRIDS OF *P. divaricata* AND *P. pilosa* (*P. glutinosa*)

A native *Phlox* named by Buckley *P. glutinosa* lies so exactly intermediate between the two species just discussed that it is regarded as a natural hybrid between them. Similar material sold by a few nurseries under the name *P. pilosa* appears to represent the result of artificial crossing of



Phlox amoena

the same parents, and should bear the name of the hybrid instead.

PHLOX FLORIDANA BENTHAM

This species is a rare endemic of the Apalachicola valley in western Florida and adjacent parts of Alabama and Georgia. So far as known it is not hardy northward, and has never been brought into cultivation outside of its native area. Through some misunderstanding, particularly inexcusable since the type specimen of the species is preserved in the herbarium at Kew, British horticultural writers have transferred the name *floridana* to a Phlox belonging to a different section, (*P. glaberrima*, discussed below) and the name is almost universally misapplied. Actually *P. floridana* in the sense of its original describer, Bentham, is a close relative of *P. pilosa*, differing chiefly in that its upper leaves are gradually and regularly reduced in size, and lie appressed against the stem. This spe-

cies name should be withdrawn from horticultural literature unless and until the plant which bears it is definitely brought into gardens.

PHLOX AMOENA SIMS. HAIRY PHLOX.

This species name forms the outstanding example of confusion resulting from different usage on the part of taxonomists and horticulturists. It was originally applied by Sims to a plant collected in South Carolina by Fraser in 1786, characterized by having small oblong leaves and bright purple flowers in a compact cyme surrounded by bracts, the herbage being coarsely hairy without any suggestion of glandularity. Owing to an error made by Asa Gray in the fifth edition of his Manual of Botany (1868), which he corrected only two years later, horticulturalists consistently misapply the name to a hybrid between two entirely different species, one of them *P. subulata*, already discussed, and the other *P. stolonifera*, which

*Phlox stolonifera*

will be taken up next. If the name *amoena* is used for this at all, it should be followed by the word Hort.; but the prior name *P. procumbens* Lehmann should really be adopted for it instead.

The true native *Phlox amoena* of Sims is a southeastern species, its dispersal-center lying in the Appalachians along the boundary between Alabama and Georgia. From there it has spread to Putnam County, Florida, to the eastern marginal counties of Mississippi, to southernmost Kentucky, and to central North Carolina. Persistent reports of its occurrence in Arkansas, Missouri, Indiana, and Virginia have thus far proved fallacious, other species being mistaken for it. The normal habitat is open woods or thickets in rather acid soil, and probably one reason for its practical disappearance from horticulture has been its inability to thrive in rich garden loam. Two or three dealers in native plants are now offering it,

however, and it is well worthy of trial in partly shaded and acid-soil rock or wild gardens.

HYBRIDS OF *P. divaricata* AND *P. AMOENA* (× *P. rugelii* BRAND)

Where these two species grow in the same vicinity they occasionally cross, producing plants which combine the parental characters, and have flowers of a lovely rose color. Attempts should be made to produce this hybrid artificially, as a plant with considerable horticultural value might be obtained.

THE EASTERN LONG-STYLED PHLOXES (SECTION OVATAE)

While the six members of this section resemble those of the next-preceding in habit, they differ in having the sepals united into a tube for more than half their length, and in the stamens and styles being much longer than the calyx, and sometimes even longer than the corolla-tube.

PHLOX STOLONIFERA SIMS. CREEPING PHLOX

Reaching its maximum development in West Virginia, this species ranges south to Wilkes County, Georgia, west to Hocking and Jackson Counties, Ohio, and north to Elk County, Pennsylvania. It is a markedly stoloniferous plant, forming good-sized mats in the litter of deciduous woods, or occasionally on rock ledges, seemingly preferring a slightly acid soil.

This Phlox has several attractive color forms. Perhaps the most beautiful is a clear violet,—the hue shown by Fraser's original material—but bright phlox-purple and lavender forms are also attractive. These attain their maximum brilliance when it is grown in partial shade, and it is less satisfactory when planted in sunny rock gardens. The individual flowers are often rather large, and the golden stamens peeping out from the tube add to their attractiveness. The upper herbage is glandular pubescent, and the runners bear spatulate leaves which persist over winter.

Discovered in Georgia by Fraser in 1786, this plant was successfully introduced by him into English gardens in 1801. Its horticultural value was immediately recognized, and it has been grown there ever since, but is only beginning to be appreciated in the United States. Several nomenclatorial points require discussion in connection with this species.

coerulea. The name sometimes inappropriately given to the violet color-form.

crassifolia. An obsolete synonym, applied to purple color-forms.

procumbens. Though occasionally used for the species itself, this name properly applies to one of its hybrids, discussed below.

prostrata. Another obsolete synonym.

reptans. Unaware of Sim's prior publication, Michaux used the name *reptans* for the same plant, and has been followed considerably in horticultural literature, in spite of the fact that the earlier description and naming appeared in Curtis's Botanical Magazine, which is devoted largely to cultivated plants. This later name should be discarded, as a mere synonym.

violacea. The preferable designation for the lovely violet-flowered form of the species.

HYBRIDS OF *P. stolonifera* AND *P. subulata* (\times *P. procumbens* LEHMANN) FIG. 8.

As already noted under *Phlox amoena*, this name is almost universally misapplied in horticultural literature to a hybrid for which the valid name is \times *P. procumbens* (also sometimes labelled *P. verna* Hort.) This hybrid appears to have been produced in Germany in the early 1800's, being first mentioned in a catalog of seeds issued by the Hamburg Botanical Garden in 1828. It is a very attractive and vigorous plant producing a wealth of bright phlox-purple flowers in Spring, toward the end of the blooming season of *P. subulata*, and before the flowers of the true *P. amoena* appear. How different the latter is from this hybrid can be seen on comparing the illustrations given here.

While various opinions have been expressed as to the parentage of this hybrid, consideration of its features points unmistakably to the two here designated. In development of stolons, outline and size of leaves, glandularity of herbage, outline of corolla-

*Phlox Buckleyi*

lobes, and length of stamens and styles it lies exactly intermediate between these species, and shows no approach in its characters to any other *Phlox*. Most of the material in the American trade (as "*P. amoena*") appears to represent a single clone, although another clone with white-bordered leaves is occasionally offered.

PHLOX BUCKLEYI WHERRY. SWORD-LEAF PHLOX

Though it had been collected by Buckley as early as 1838, the distinctness of this species was not recognized until 1930. It occupies the smallest range of any of the eastern *Phloxes*, being endemic in about five counties along the border between Virginia and West Virginia. Apparently thriving only in open woods on slopes of shale rock, it seems unlikely to be successfully cultivated. In the Fall it produces rosettes of evergreen sword-shaped leaves, and in late Spring

sends up moderate-sized flowering shoots with the upper herbage and even the corolla-tube densely glandular. The flowers are bright purple in color, but not especially different in aspect from those of several other members of the Section.

PHLOX OVATA L. MOUNTAIN PHLOX.

Like *P. stolonifera* this is a southern Appalachian plant, although the ranges of the two differ in detail. Starting from a dispersal center in the Blue Ridge near the boundary of Virginia and North Carolina, the present one has spread across the Piedmont of the latter state, into the Appalachians of Georgia and Alabama, locally to northern Indiana and Ohio, and to central Pennsylvania. Its favorite habitat is the moderately acid litter of an upland oak forest, but it occasionally extends out into moist grassy or rocky places.

Phlox ovata produces from the

*Phlox ovata*

crowns short but conspicuous sterile shoots which do not, however, become stoloniferous. Its flowering shoots bear very few nodes, and the herbage is nearly glabrous. Some strains have rather dull magenta flowers, others brilliant phlox-purple ones. In Walker County, Alabama, a related *Phlox* occurs with ample inflorescences of relatively large flowers of soft rose, pink, and whitish hues, making it one of the most attractive in the whole genus. This has recently been named *Phlox ovata pulchra*.

Introduced into English gardens, according to Miller, in 1759, this *Phlox* has since been cultivated there to a moderate extent, and is also offered by a number of American nurserymen, sometimes under the correct name, and again as *P. "carolina,"* which is here regarded as a wholly distinct species. Names used in connection with it comprise:

carolina. Being unacquainted with the plants in the field, Gray thought that the one to which Linnaeus had

applied the name *carolina* was the same as his *ovata*, and has been followed in most horticultural writings. More recent work has shown, however, that Linnaeus was right in distinguishing them, as they differ in several essential respects, and *carolina* is therefore not to be regarded as in any way a synonym of *ovata*.

latifolia. Suitable as a varietal name for the widespread phase of the species.

listoniana. An obsolete synonym of *ovata*.

pulchra. Applied to the Alabama variety of *P. ovata*, which has especially beautiful flowers of soft pink hues.

PHLOX CAROLINA L. THICK-LEAF
PHLOX

The *Phlox* represented in the type specimen of Linnaeus's *P. carolina* has its dispersal-center in western North Carolina, and ranges from there to the Gulf Coast and to the Ohio valley,



Phlox carolina (two varieties)

reaching its northeastern limit in Virginia or possibly Maryland. It grows in open woods and sometimes in meadows of slightly acid soil-reaction, and blooms from May to September.

From *P. ovata* it differs in having but poorly developed, elongate sterile shoots, more numerous nodes on the stems, shorter calyx, and usually smaller flowers. The leaves vary markedly in size and shape; the lowermost are always linear, and on some plants they scarcely broaden to the very top of the stem, while on others they rapidly increase in breadth at successive nodes until the uppermost are broadly ovate or elliptic and exceed those of *P. ovata* in dimensions. The herbage may be glabrous but is often slightly pubescent, and occasionally rather densely so, the hairs being glandless. In flower-color it is uniformly bright phlox-purple, or very rarely pallid to white.

Curiously enough, in view of the confusion as to its taxonomic status, this seems to have been the first

Phlox brought into cultivation in European gardens. In 1728 a colored plate of it was published by Martyn, with the statement that it was at that time being grown in Cowell's nursery at Hoxton. Four years later it was listed by Dillenius among the plants being grown in the Eltham garden. Linnaeus overlooked it in preparing his *Species Plantarum*, but included it in the second edition of that work under the name *P. carolina*; having been published in 1762, this name has clear priority. Hill called it "Rugged-stalked brightweed, *Phlox caroliniana*," and the large size attained by a plant of it growing in the garden at Marburg led Moench to propose the substitute name *P. altissima*.

About 1800 it was reintroduced by Fraser, and material obtained from him and cultivated at Malmaison was named by Ventenat in 1804 *P. suffruticosa*. In spite of the existence of three earlier names, this one has found the greatest favor in horticultural circles, and the whole class of

thick-leaved hybrids is known as the "suffruticosa phloxes."

The earliest hybridization was apparently carried out with *Phlox carolina*. The existence of such hybrids as early as 1820 is mentioned in the literature, although their exact parentage is unknown. The first to be named was apparently *P. × "shepardii,"* introduced by S. Shepard, of Bedford, England, about 1824. Other hybrids or horticultural varieties which early attained prominence were "*cordata*" (Springle, 1825) "*coldryana*" (Coldry, 1835), and "*vanhouttei*" (Rodigas, 1838). From the meager data available in most cases it is impossible to tell whether such names were applied to plants of this *carolina* (or *suffruticosa*) series, or whether they belonged with *P. paniculata* (the *decussata* series) instead.

An alphabetical list of names other than those of horticultural varieties used in connection with *P. carolina* follows:

altissima. A varietal name for the tall, large-leaved late-blooming phase of *P. carolina* native to the mountains of North Carolina and Georgia.

carnea. A color-form, with flesh-pink flowers, scarcely deserving an independent name.

carolina. Taken as the name of the species itself, in accordance with the principle of priority; a variant spelling is *caroliniana*. In spite of literature statements, not a variety or relative of *P. ovata*.

glaberrima. While this name properly belongs to a distinct species, discussed below, it is often applied to narrow-leaved forms of *P. carolina*.

heterophylla. To be regarded as a varietal name for the early-blooming phase of the species with especially variable leaf-outline, occurring in Alabama and adjacent parts of other states.

maculata. Although Linnaeus applied this name to a quite different plant, which will be described later in this article, it is occasionally used by horticulturalists for phases of *P. carolina* with spotted stems.

nitida. A minor variant of *carolina*, with somewhat shining leaves, unworthy of taxonomic recognition.

ovata. Sometimes applied to phases of *P. carolina* with ovate leaves, but should be restricted to the wholly distinct species which first received the name.

suffruticosa. In the strict sense this name is a mere synonym of *carolina* and of *altissima*. However, in view of the fact that it has been used so extensively for hybrids into which varieties of *P. carolina* have entered, its retention as a designation for such hybrids is to be recommended.

triflora. An available name for the earliest blooming variety of *P. carolina*, which ranges from North Carolina to southern Indiana and to Virginia or Maryland.

PHLOX GLABERRIMA. SMOOTH PHLOX.

From a dispersal-center in the Alabama uplands this Phlox has reached the Atlantic coast in South Carolina, the Gulf coast in all bordering states, the southeastern corner of Wisconsin, and the Piedmont of Virginia. It grows chiefly in moist meadows, or occasionally in open woods, and appears to prefer sterile and acid soil, though occupying neutral situations northward.

Its moderate-sized flowers range in color from phlox-purple to pink or rarely white. In spite of its name it is sometimes slightly pubescent.

Although in the interest of simplicity and convenience it is classed as a distinct species, it admittedly in-

*Phlox glaberrima*

tergrades with *Phlox carolina* on the one hand and with *P. maculata*—the next to be taken up—on the other. From the former it is best distinguished by its more numerous nodes, narrower leaves, and shorter calyx; it is also developed chiefly at lower altitudes. The stem of *P. maculata* has still more nodes, and its inflorescence tends to be elongate-conical instead of corymbose; its range is on the whole more northern.

The first published reference to this *Phlox* was that of Plukenet in 1705, and he indicated it to have reached him from Florida; to this day English horticulturists term it *Phlox floridana*, although as already pointed out this name properly belongs to an entirely different plant. About the same time Clayton found it in Virginia, and sent seeds or living material to Gronovius, who in turn contributed it to Clifford's garden. Here it was seen by Linnaeus, and when he came to divide the vegetable kingdom into genera in 1737, he based

the genus *Phlox* on this plant. What appears to be Clayton's original locality has recently been rediscovered in Chesterfield County, Virginia. In Europe it has been continuously cultivated since these early days, but in America it is almost unknown.

No horticultural varietal designations seem to have come into use in connection with the species; that the application to it of the species name *floridana* is quite erroneous has already been pointed out. The term *glaberrima* occasionally gets applied to glabrous phases of other species of *Phlox*, but should be used only for the narrow-leaved long-styled plant here discussed.

PHLOX MACULATA. MEADOW PHLOX.

The dispersal-center of this species appears to have been located in the Ohio valley, perhaps near the boundary of Kentucky, Ohio, and West Virginia. From there it has spread south into North Carolina and Ten-



Phlox maculata

nessee, but reports of it in more southern states, even in Florida, have no foundation. On the west it has reached southeastern Minnesota, and on the east the southern part of Quebec and western Connecticut; escapes from cultivation are also known at several places in New England and New York. It grows chiefly in moist meadows or on alluvial flats along streams, exhibiting no preference for any particular degree of soil acidity.

Its species name refers to the purple spots which are frequently present on its stems, but this can not safely be used as a diagnostic character, because on some individual plants spots are lacking, and on the other hand the stems of several other species of *Phlox* are often more or less spotted. Its real distinguishing features are the slender horizontal rootstock, absence of all prostrate sterile shoots, completely deciduous habit, numerous nodes on the flowering stem, smooth leaves with obscure lateral veins, grouping of the cymes of flowers into

a long cylindric or conical panicle, and short calyx.

Though listed by Plukenet as early as 1700, it apparently found its way into horticulture only about 40 years later, when it was sent to Collinson by a Dr. Witt (from eastern Pennsylvania?). Since then it has remained in cultivation to some extent both in Europe and America, although considerable nomenclatorial confusion has arisen in connection with its color-forms and other variations. This has resulted in part from the tendency to apply the name *maculata* to any *Phlox* showing purple spots on its stem, and in part from the use of independent names for what can scarcely be regarded as more than varieties. The more important of these names will now be discussed.

alba. An albino phase of the northern, early blooming variety of the species.

candida. A similar albino of the more southern and later-blooming variety. Horticultural names for this



Phlox amplifolia

are *longiflora*, *omniflora*, and *tardiflora*.

odorata. This name refers to the sweet scent, which is especially well developed in the more northern variety of *P. maculata*, and may be used as a varietal designation for this.

pyramidalis. Being the earliest name applied to the southern variety, this may well be adopted as a varietal term.

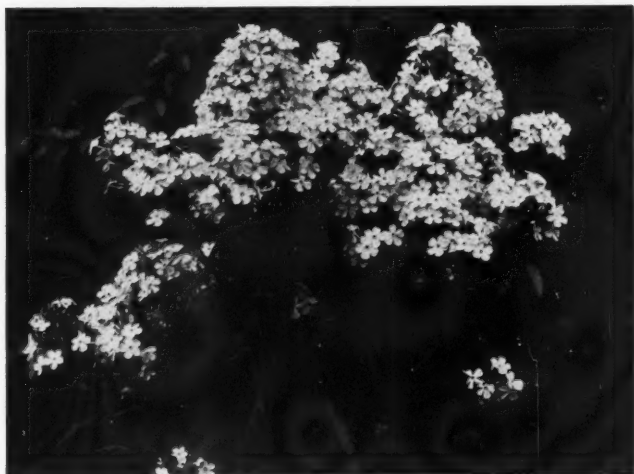
suaveolens. The prior name for the albino phase of variety *odorata*.

REPUTED HYBRIDS OF PHLOX MACULATA WITH OTHER SPECIES

As already noted under those species, apparent intergradations of both *P. carolina* and *P. glaberrima* with *maculata* are occasionally found, and these may be due in part to hybridization. Several well known clones which are extensively cultivated, notably Alpha, Miss Lingard, and Miss Verboom (usually classed as "*suffru-*

ticosa") show such elongate inflorescences as to suggest the entrance of *P. maculata* as one of their parents. Further work upon them will be necessary, however, before it can be decided whether they are actually such interspecific crosses, or half-breeds of distinct varieties of the same species (in this case *P. carolina*). The famous striped Phlox Van Houttei, developed in 1838, was alleged to be a cross between *P. "suaveolens"* and *P. "carolina,"* but there is no evidence that either of these names was used in their correct sense.

The assertion is frequently made in both horticultural and taxonomic literature that *Phlox maculata* is one of the parents of the *decussata* group of Phloxes, which has been so extensively developed in recent years. The lack of evidence in support of this assertion will be reviewed after their real parent, *P. paniculata*, has been discussed.

*Phlox paniculata*

THE EASTERN VEINY-LEAVED PHLOXES. (SECTION PANICULATAE)

But two species are included in this section, which differs from all others in the leaves having prominent anastomosing lateral veins and ciliate-serrulate margins. Another peculiar feature is that the anthers are cream-colored or white, instead of the bright yellow characterizing most other eastern species.

PHLOX AMPLIFOLIA BRITTON. BROAD-LEAF PHLOX

This rare *Phlox* ranges from the Interior Plateaus of Tennessee to the Piedmont of Alabama, the Ozarks of eastern Missouri, and the Ohio valley in southernmost Indiana. It grows chiefly on rocky hillsides in woods or thickets, the soil reaction being circumneutral. It bears a few opposite broad and often bristly leaves, its inflorescence-herbage is glandular, and its corolla-tube is glabrous. The corolla-color is mostly rather pale pink,

and it is practically unknown in cultivation, though worthy of trial in wild gardens.

PHLOX PANICULATA L. VEINY-LEAF PHLOX

The dispersal-center of this well-known species lies along the Ohio River, perhaps in Indiana, from which it has migrated to northern Georgia, Arkansas, northeasternmost Kansas, and central New York. It has also escaped from cultivation extensively both within and without this range, especially frequently in New York and the New England states. Its preferred native habitat is a thinly wooded alluvial flat where the soil is rich and circumneutral in reaction, but it may escape to roadsides, rubbish-heaps, and waste-places generally.

Differences from its relative, *P. amplifolia*, comprise more numerous nodes with mostly subopposite leaves, these being lanceolate to oblong-ovate, and glabrous or less often pubescent,

with the hairs rarely bristly; the inflorescence-herbage is only exceptionally glandular, while the corolla-tube is almost always pubescent. The features given as characterizing the Section will serve to distinguish it from *P. maculata* and other members of the *Ovatae*.

Though listed by Plukenet as early as 1700, this Phlox was first brought into cultivation by Sherard in 1732. Bartram sent it to Collinson in 1743, the source of the material in all these cases being Virginia. It was apparently first figured by Miller in 1760, an earlier illustration often supposed to represent it corresponding better to *P. carolina*. When and how the development of the numerous horticultural varieties of *P. paniculata* began is shrouded in mystery, largely an account of the chaotic state of the nomenclature; for various writers use two or more names for the same species, and worse still, apply a single name, such as *maculata* or *suffruticosa*, to four or five different species. Accordingly, when a hybrid is reported as produced between two supposedly distinct species, duly named, there is no way to tell what the parents really were.

Perhaps the most frequent statement as to the ancestry of the modern late-summer flowering Phloxes (\times *P. decussata*) is that they arose from a cross between the native *P. maculata* and *P. paniculata*. This has been faithfully copied from one article to another, and has even been accepted by some taxonomists, especially by the German monographer Brand. The present writer has ventured to doubt it on the following grounds: (1) All the horticultural varieties exhibit prominent leaf-veins, long calyx-lobes, pubescent corolla-tube, and cream-colored anthers, such

as characterize only *P. paniculata*; there is no indication in them of intermingling of the features of *P. maculata*, namely obscure veins, short calyx-lobes, glabrous tube and golden anthers. (2) Most of the varieties in question produce abundant viable seed, which would not be expected in an inter-species hybrid; and when this seed germinates, the seedling plants show the characters of *P. paniculata*, often including, as gardeners know only too well, a dingy magenta corolla-color. If *P. maculata* had entered into the cross, part of the seedlings would exhibit features belonging to it, but they never do. The conclusion seems inescapable that \times *P. decussata* represents a half-breed, that is, a cross between varieties of the same species, rather than a bispecific hybrid.

Interpreting the literature in the light of the viewpoint just presented, the first horticultural variety of \times *P. decussata* was introduced in 1824 by an English nurseryman, G. Wheeler, of Warminster, and came to be known as *P. "wheelerii"*. By that time varieties of the native *P. paniculata* had reached Europe from different sources, and the new variety probably represented a half-breed between two of them. In 1839 Lierval, in France, definitely undertook the development of improved varieties, and as a result of his work and that of many others, one after another appeared in rapid succession. An account of subsequent events has been published by Pridham in Bulletin 588 of the Cornell University Agricultural Experiment Station (1933), although his nomenclatorial usage does not wholly correspond to that in the present article. The significance here attached to the quasi-specific names which appear most frequently in the literature now deserves discussion:

acuminata. A common native form characterized by the under side of the leaves being soft-pubescent, unworthy of specific or even varietal distinction.

carolina. Sometimes mistakenly applied to forms of *P. paniculata*.

decussata. Although originally used as a synonym of the native "*Phlox acuminata*," this name has come into such universal use for half-breeds of *P. paniculata* that it may be definitely adopted for them; the name should, however, be preceded by \times .

macrophylla. A horticultural term for broad-leaved phases of $\times P. decussata$.

maculata. This name, first applied by Linnaeus to a well-marked native species, the characters of which have been described above, has come to be used for variants of several other species of *Phlox* exhibiting more or less spotted stems. Probably the source of the idea that "*Phlox maculata*" has entered into the parentage of $\times P. decussata$, which as just pointed out seems untenable, has been such an erroneous application of the name to a spotted clump of *P. paniculata*.

scabra. A rare variant of the native *P. paniculata* having the upper leaf-surfaces covered with bristly hairs. This represents an approach toward *P. amplifolia*, but unlike that species the corolla-tube is pubescent and the stamens are exserted.

undulata. A variant of *P. paniculata* with wavy-margined leaves, deserving neither specific nor varietal segregation.

HYBRIDS OF *P. paniculata* WITH OTHER SPECIES

$\times P. arendsii$. (*P. divaricata* \times *paniculata*). This cross has been made repeatedly and has resulted in several named varieties differing in detail of habit and color. All of the

plants combine the features of the two species concerned in such a striking way as to leave no question as to their parentage. No viable seeds are produced.

$\times P. criterion$ or $\times P. leopoldiana$. (*P. drummondii* \times *paniculata*). No data are available to the writer as to the validity of the alleged ancestry of these, and further study of them is needed.

In spite of many published statements as to the existence of hybrids with still other species, no satisfactory evidence is as yet at hand.

THE EAST-TEXAN ANNUAL PHLOXES (SECTION DRUMMONDIANAE)

PHLOX DRUMMONDII. ANNUAL PHLOX

This species is native to the Coastal Plain of east-central Texas, and was described and named by Hooker in 1835 on plants raised from seed collected by Drummond the preceding year. It has since escaped from cultivation at many places throughout the world, and has become fully established in various regions with mild climates. Its preferred habitat is grassland over more or less sandy and somewhat acid soil, and it thrives best in cultivation under similar soil conditions.

Aside from the annual habit this *Phlox* is characterized by reduction of the stem proper nearly to the vanishing point, the bulk of the plant consisting of an unsymmetrical pseudoracemose inflorescence with conspicuous alternate bracts. Both herbage and corolla-tube are coarsely and often glandular-pubescent, and relationship to the Section *Divaricatae* is shown in the short stamens and styles. Considerable variability is exhibited in its native colonies. In some the plants all have broad leaves and bracts,

in others these are uniformly narrow, and in still others both types are intermingled. In many colonies the flowers are phlox-purple, but in a few they are uniformly bright red, with admixture of the two also occurring; judging from the original description, Drummond's seed came from one of the colonies where the colors were intermixed. Under cultivation various mutations in respect to corolla color and lobe-outline have appeared, and by crossing and selection a considerable series of horticultural varieties have been developed. The names applied to the latter will not be listed here, but a number which have been proposed for native varieties or related species require discussion.

criterion. As already noted under *P. paniculata*, an alleged hybrid of the two species has been given this name, but its status requires confirmation.

cuspidata. Although originally used for a native form with somewhat pointed corolla-lobes, this name has come to be applied with these lobes deeply three-toothed.

glabriflora. A native variety with narrow leaves and glabrous corollatube.

heyholdii. On the plate accompanying the original description of *P. drummondii*, both a red and a purple color-form were figured. The former has received the special name *heyholdii*, but this can scarcely be regarded as anything but a form-name.

leopoldiana. See *criterion*.

stellaris. The preferred name for the "Star-Phlox," referred to under *P. cuspidata*.

tenuis. Sometimes considered a variety of *P. drummondii*, but differs in so many respects that it is probably to be regarded as a distinct species. It is a low, rather small-flowered plant

of south-central Texas, of no particular horticultural interest.

wilcoxiana. A synonym of *heyholdii*, the red-flowered element in the original *P. drummondii*.

SOME WESTERN PHLOXES

Although most of the members of the genus *Phlox* are native to the western half of the United States, few of these have as yet been brought into cultivation, except in rock or wild gardens in the vicinity of their native haunts. Notes on those which have been tried more widely may be given here.

Phlox adsurgens. A native of western Oregon and northern California, closely related to the eastern *P. stolonifera*, and like it spreading by stolons into large mats through the litter of deciduous forests. The lower leaves of the western plant are elliptic rather than spatulate, and practically glabrous, while the flowers average smaller than those of the eastern one, and their color tends to be rose with a paler eye. This is being grown in a few eastern gardens, but seems to be short-lived there.

P. andicola. This is the common Phlox of the drier country on the Great Plains, and up into the eastern Rocky Mountains. It forms attractive little tufts in bare soil between clumps of buffalo-grass and on rock ledges, and efforts have been made to introduce it into rock gardens, under names such as *P. douglasii*, *hoodii*, or *planitiarum*. In humid atmospheres, however, it fails to thrive.

P. caespitosa. This native of the northern Rockies and Cascades is being distributed by west-coast dealers under the names *diffusa*, *douglasii*, or *hoodii*, although the material does not agree with the types of any of these species. In habit it is some-

what like the eastern *P. subulata*, but the pinkish flowers are borne singly or in sparse compact cymes. This has thrived and even produced seedlings in one or two eastern rock gardens.

P. diffusa. Differing from *P. caespitosa* only in minor technicalities, this Sierran-Cascade rock-plant requires no additional comment.

P. douglasii. A low-growing, densely glandular, subulate-leaved *Phlox* of the Blue Mountains of Oregon. Not in the horticultural trade, the name being erroneously applied to *P. andicola*, *P. caespitosa*, *P. diffusa*, etc.

P. hoodii. This name is correctly applicable only to a dense, dwarf, cushion-forming plant which grows in dry soil on the high plains from Nebraska far north into Canada. The white flowers are tiny, but may cover the plant completely for a few days in Spring. It is not in cultivation, and probably would not thrive; material offered under this name represents one or more of the species already listed.

P. kelseyi. A moderate-sized cushion-forming linear-leaved species of

the northern Rocky Mountains. It bears attractive pale lavender flowers, and has some horticultural promise. Several other species are, however, offered under this name.

P. multiflora. A relative of the preceding, with the flowers borne singly on longer pedicels, and the inflorescence-herbage nearly glabrous.

P. nana. A tufted *Phlox* resembling the eastern *P. pilosa* in habit, but with more numerous densely glandular leaves, and fewer flowers, in compact cymes. The large rose-colored flowers with golden centers are very attractive, but as the species is native to rather dry parts of New Mexico and western Texas, it may not thrive in eastern gardens. Sometimes offered as *P. mesoleuca*.

P. planitiarum. A synonym of *P. andicola*, discussed above.

The writer will be glad to receive word of the appearance on the market of species other than those above listed, and will endeavor to furnish, for any specimens submitted, the name which is acceptable under the International Rules of Botanical Nomenclature.

Collecting Plants Beyond the Frontier in Northern British Columbia

PART VI

MARY G. HENRY

THE morning of July 27th was cold and dark. Our little white tent, as it clung to the mountain, seemed very small, and I felt about as inconsequential as, I expect, a barnacle must feel when it adheres to an ocean liner. The view as I stepped from the tent, with all the great, gray, forbidding looking mountains surrounding us, was a thrilling one. A gentler joy stirred within me when I repaired to the tiny stream and saw again the exquisite little *Primula egalikensis*.

I sank all the cans of plants, that I had so far collected, in the damp moss, for we had to pass this spot on our return journey, and we left camp. I sent the pack outfit on ahead, as I desired to go over the side of a mountain. So Jo and I, together with McCusker, took a more circuitous route. At first we descended into a valley and then climbed higher again. In the moist peaty ground there were many little bushes of *Rhododendron lapponicum*. They were fairly upright growing and were about one foot high. Farther away and on a rocky ridge with a northern exposure, it grew in the more orthodox, prostrate fashion.

As we rose higher up the side of the mountain we wandered through great drifts of, first, pretty fragrant *Lupinus arcticus*, clad in blue of a shade that would match an evening sky, and then as we went on our way, and these thinned out, altitude 6,000,

Hedysarum Mackenzii, the arrogant, rebellious, and untamed beauty that wants a whole mountainside, or entire stony riverbank, to itself, and flaunts its striking shade of magenta in such a way few other flowers dare bloom nearby. One cannot help admiring its sheer audacity, and its bravery too, for often it climbs to great altitudes and chooses habitations that would make many a less bold plant positively dizzy. They, too, possess a delicious, fresh fragrance and, as is usual with Alpine plants, their flowers increased in size as they climb higher, so that here, about their limit, they were at their very best and their large showy flowers in countless thousands, made a brave display. There were two beautiful pure white ones among them and one pale lavender, this latter a most lovely plant.

We climbed higher still, but there was little vegetation above the *Hedysarums*, except *Draba incerta* and a few saxifrages. On our way down I found *Antennaria megacephala*,* a pretty little two inch everlasting growing in a bare stony slide.

We descended the mountain and then went on our way down the Caribou Pass. We came to a stream and again the little *Primula egalikensis* was strewn along its banks, more beautiful, perhaps, than ever, for here the little flowers were all as white as drifted snow! A little further on we came to burned over timber where there were some fine bushes of *Rho-*

*Fernald new sp.



Mary G. Henry

Anemone narcissiflora in Caribou Pass. Alt. 5,000 ft.

dodendron albiflorum in bloom, also *Vaccinium membranaceum*, which later on would carry its edible dark red fruit.

After a fourteen mile rather rough ride during which we descended from 5,500 feet to 4,200 feet, we stopped for the night. The little stream had become quite a torrent and raced noisily over the rocks between the high banks. Our tent was set up facing the east so I could see the sun rise over the mountains in all its early morning splendor.

As usual, especially in the evenings, we enjoyed our campfire immensely. It was cold and the sky was dark and stormy. But what matter? We had great big logs for our fire and as it crackled and sparkled it gave out a cheerful warm glow. We reclined in

comfortable positions with our backs to the tent, and listened to the Victrola. It was very peaceful and we were all in a pleasant frame of mind after our usual long, hard day.

I got up to get something when to my horror I saw our tent on fire! A spark had lighted the mosquito netting that was draped in folds across the front. The awful thought that everything we possessed was in that tent came rapidly to me. One's mind races like mad under similar circumstances and I thought of our many specimens, our photographic equipment, and then, too, our beds and clothes! The flames climbed high. Unwisely, I grasped the tent and shook it, which only made matters worse. McCusker knew better; he grabbed our coats, lying on the ground



Mary G. Henry

Our tent was set up facing east so I could see the sunrise

nearby, and smothered the flames with them. Our coats were blackened, but the tent and our possessions were saved.

The Victrola went on playing. We pushed the logs farther away and sat down again to enjoy the fire which crackled and sparkled merrily on.

The days were shortening and it was now dark by about 9:30. Several times during the past night we were awakened by thunder and lightning. We always enjoyed it, for thunder

and lightning are twice as exciting in a tent as in a house.

The 28th dawned dark and cold. The clouds were so low, little could be seen of the mountains except their bases. It looked as if it would snow, and Jack, our cook, and a most important person, wanted to lay over a day. But our time was so limited that I could not bear the thought of losing any, so we packed up while overhead it grew gloomier every minute. For about an hour we wound in and out

among the spruce trees, and the sky grew blacker still. Underfoot the ground was saturated from the recent rains, and almost every step the horses took made a splash, and when we came to the muskeg we sank deeply. After a while the trees grew farther apart, for which we were glad, as by this time our legs ached sorely, for our horses had bumped us frequently against the close growing trees.

It soon started to hail, or something akin to it, for large compressed balls of snow, about three-quarters of an inch in diameter, rained down and struck us with such force, it almost put the horses in a panic. They dashed forward and around in quite a disorderly way, and it took us some time to quiet them down, especially the pack horses. In about half an hour the hail turned to rain, and then it poured for about an hour and a half without a let up. The ground was soft and in bad shape, which made hard going. The rain kept up more or less all day and part of the night, but the following day was clear, for a while anyhow.

We crossed over Summit Pass and followed the south fork of the Besa River (more white primroses here) and then rode over a level stretch of land thickly covered with *Pinus contorta latifolia*, when the mountains that surrounded Redfern Lake came in view. We forded the Besa River, which was very high and very swift, almost a swimming proposition. *Hippurus vulgaris*, an aquatic plant, grew submerged in a shallow pool. We soon stood once more beside Redfern Lake. It was more beautiful even than last year, for this season there was more snow on the mountains.

Our tent was soon up and we felt thoroughly at home. We found swimming in the lake was much pleasanter

than rolling in a stream, which was all we had been able to do recently.

The following day, July 30th, was a red-letter day for the horses because they were to have a rest, and a red-letter day for me, for I was to climb a mountain. I started out with McCusker about 9, and Jo and Smoky were to start off soon after. It did not take long to get above the trees, and then began the array of flowers. A little higher, about altitude 5,000, *Arnica parryi*, a strange rayless composite, was growing in a moist, sheltered nook. The silvery leaved *Oxytropis splendens*, also a handsome green leaved *Oxytropis* species, with fine pure blue flowers, were here, and then came the yellow *O. saxi-montana*, but the flowers of these latter had faded.

We were aiming for a high basin, and after reaching and crossing it we arrived at the foot of the rocky, jagged mountainous ridge that hemmed us in on three sides. *Draba alpina* and *D. fladnezensis* grew in abundance at about altitude 5,500, and the little blue *Gentiana propinqua*, scarcely one inch high, grew in moist peat amongst the stones. Higher up *Saxifraga oppositifolia*, one of the brightest of all the plants at this high altitude in these mountains, grew far beyond all other vegetation. Although less than one inch high, it managed to make itself a conspicuous object by reason of its showy purple flowers. Such a lowly little plant, yet such a brave one, one could not but pause and admire.

Ahead the slope was exceedingly steep, so we left our equipment under a big rock, except a camera, the barometer and level. At first we had to cross a rocky slide composed of large and small stones, and as it was very steep and there were few that



Josephine Henry

Saxifraga oppositifolia

were stationary, we could not hurry. After about an hour of this uncertain going, we came to where the mountain seemed nearly perpendicular. McCusker chose to go up where there was an indentation in the almost sheer rock, which was probably caused by falling stones. Going up this way would have been comparatively safe

had the rock been solid, but almost every little ledge we caught hold of with our hands broke off, and nearly every rock on which we set our feet slid off, too! I was up against a similar situation in New Mexico a few years ago. These are awkward occasions.

McCusker was ahead and after a

*K. F. McCusker**Looking into Gladwyne*

fair sized falling rock dislodged, and just missed me, I moved over to one side until he reached more solid stratum. Then I climbed up.

There was another rock slide above, and when this was accomplished we

found ourselves near the steep, rocky, jagged crest. This was not as difficult to climb as it looked and before long we were peering over the top into a vast, wild, alpine valley. McCusker thought that this must have



Mary G. Henry

Looking south from mountain

been the place where Mary shot her two Stone Sheep last year, and that the creek below must have been Gladwyne Creek.

It was so cold and windy I could scarcely keep my eyes open sufficiently

to see. So we did not linger but turned almost immediately and descended, choosing a different and a little less difficult way down. It was slow work, although we travelled as fast as we could, and it was supper



above Gladwyne Creek

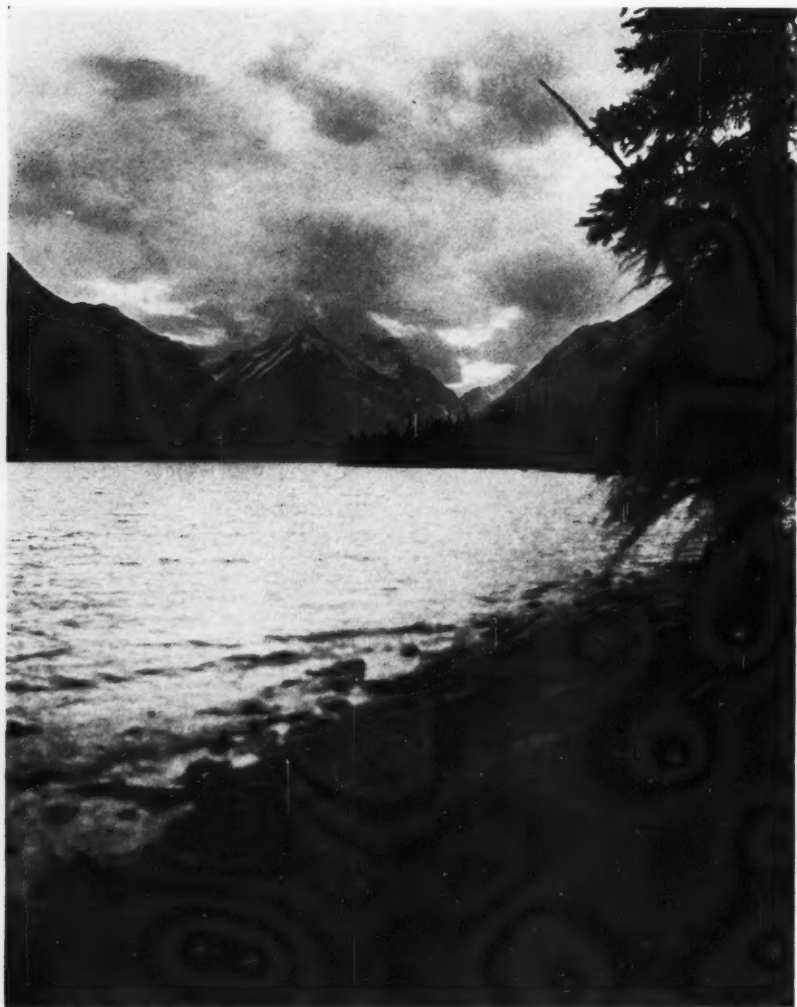
time when we got back to our camp.

July 31st was cloudy and cold, but it began with a swim in the lake, always an enjoyable event. We were all quite excited, for today we were to step off the map. We packed

lightly and left Ben, the big tent, and about half of the horses, behind.

To begin with, McCusker found that Redfern Lake, instead of being three miles long, was five miles long.

A faint Indian trail ran along the



Mary G. Henry

We rode along Redfern Lake, aiming for the mountains beyond

north shore, but ended at the far end of the lake. We then followed more or less along the river that came down from the mountains to the west and fed the lake. The valley was very

heavily timbered with a dense spruce forest, through which we threaded our way, trying to follow a dim game trail. As Smoky aptly said, "It might be a squirrel trail, but the squirrels



Mary G. Henry

Taken from camp on July 31st. Big glaciers, not seen in picture, were on either side. The big S on Mt. Lorraine is easily seen.

have not been over it lately." Our knees were bumped, our arms and legs scratched, our clothes nearly torn off our backs, and we lost numerous articles that had been fastened to our saddles. However, we felt right then that the only thing that really mattered was to save our bodies from real injury, and particularly our eyes, which were in constant danger from the rigid branches that stuck out and

struck us on all sides. Thank goodness the woods opened up at times, and in one of these places we passed a pond formed by large beaver dams, where the beavers were evidently still working.

After a while the trees grew in scattered clumps and we rode along the river, mostly on the bare, stony bars. We could then see the great mountains about us. They appeared



Mary G. Henry

Taken near the home of Castilleja Henryae. Alt. 5,500 ft.

so high, their sides seemed so perpendicular, that they looked, with their huge glaciers, almost as if they were about to fall on top of us. It grew colder every minute as we made our way up this narrow, icy cold valley. We went on until we came to a fairly level clearing near the river and almost beneath a big glacier, when we stopped and camped for the night, altitude 4,900. We could see no evidence of anyone having ever been or camped in this valley. Even the hardy Indian needs a camp fire, and the cut stumps of trees remain in a good state of preservation for 75 to 100 years or more in this latitude and at this altitude.

After supper we heard a roar, and looked up in time to see a huge ledge of ice fall from the glacier. The fresh

break left a great pale green gash in the ice.

It had been cold and cloudy all day, but when our big camp fire was started, conditions improved.

We were delighted to see a clear morning next day, August 1st, and we could hardly wait to start off on our explorations. As our tents were but a few hundred feet below timberline, about twenty minutes' climbing took us up above the trees. There did not seem to be as great a variety of flowers as usual, perhaps owing to the coldness and limited area of the valley. I hurried on feeling sure I would find something exciting just ahead. I usually had this feeling every time I climbed a mountain.

Although exploring and photographing were the main objects of



Mary G. Henry

Gray clouds were coming up the valley of Besa River

the day, and I tried to pay no attention to the flowers, I just could not help stopping when we came to a little grassy dell, altitude 5,500, where many clumps of a beautiful paintbrush *Castilleja Henryae*,* were growing. The rich plum-purple flowers, about 4-8 inches high, surmounted attractive light gray green foliage. It was an exciting "find," as I had never before seen a purple castilleja. I had no press with me, so I put a few stems in a can, for I rarely move without a few of these.

By midday the sun was still shining, but gray clouds could be seen coming up the valley. Realizing that I must hurry in order to get my pictures, we made our way, without any more delays, towards a rocky promontory in the distance.

*New sp., kindness of Dr. Pennell.

The clouds were rapidly overtaking us and a high wind had arisen which made climbing along the steep mountainside difficult. In a short time it was blowing with such an intensity, I was unable to utter a word or hear a sound, even that of falling rocks. Of necessity we proceeded slowly, but after a few hours of tedious and sometimes ticklish work, we reached the big rock we were aiming for. The view from here was simply grand. The wind was now coming down the valley so strong it was almost impossible to stand, and several times, when squalls struck me, I nearly lost my balance.

The sight was truly a glorious one. With difficulty I undid the movie camera and when a slight lull came I turned it to the first glacier in the southeast end of the valley, and swung



K. F. McCusker

Beyond Redfern Lake. The writer felt very small here.

it over towards the west and north-west. By so doing I obtained in the picture four magnificent uncharted glaciers. By the time a few "stills" were taken the clouds, which seemed

to be coming from every direction, blotted out the sun and every vestige of blue sky.

Although it was late afternoon, I was very anxious to climb the huge



Mary G. Henry

The huge glacier at the head of the valley. The source of the Besa River.

glacier at the head of the valley and look over the rocky ramparts into "beyond."

This glacier is the real source of the Besa River, and according to McCusker is at least three miles long.

We hurried down the mountain as fast as we could until we came to the river at the foot. The brush, betula and salix, was so dense we had to wade down the river in many places. The water was up to my thighs and



Mary G. Henry

8 P. M. on the big glacier

was so swift that I almost fell several times. We followed along the river, to almost beneath the huge basin of ice, only stopping a second to cache the movie camera. From a short distance it appeared to be nearly overhanging, but when we reached it we found it was not.

We climbed the nearly vertical rocks as the water from the glacier splashed about us with a terrific roar. I doubt if I could have heard a cannon going off beside me. At times I found it almost impossible to pull myself over the enormous and sometimes slippery, wet rocks. After a while we came to solid ice. There was a nasty separation between the ice and the rock. There could be no returning for anyone who slipped here. We crossed over it and then the hardest

part began, for the ice was so steep and so slippery that we had to get on our hands and knees in order to progress at all. Even thus it was not easy to make any headway.

We traversed a number of horrid crevasses and I wondered if we would ever get our feet on solid ground again. The glacier was much larger than we anticipated, and we advanced very slowly.

We walked, climbed and scrambled on the ice until about 8 P. M., when McCusker said it would take over an hour to reach the rocky rampart to the west, our objective. The sky was dark and threatening and it was very, very cold. To spend a stormy night on a glacier would never be the choice of a sane person, so, with real regret, we turned.



Mary G. Henry

Looking west from the glacier

Going down was no better than going up. In fact, it was worse. We were not equipped for climbing ice. The iron hobs had worn smooth on the soles of my shoes, and McCusker had none on his. It was really most exciting, for in places we sat down on the ice and slid. It was the only thing we could do, as it was impossible to keep our feet. I had to dig with all my might with my heels and bare hands, till they were sore, in order not to go too quickly and land goodness only knows where. We were thankful to leave the treacherous ice when we came to a stony ledge. In due time we reached a rocky slide on which some alpine vegetation was growing, and we stood on solid ground once more.

There was an old billy-goat on a

little shelf just above us. He did not seem at all shy and we approached him quite closely, but it was too dark by this time to take a picture. We soon reached the river, which we forded and waded again and again. The rain, which had fortunately held off all day, now began but did not inconvenience us, as we were on our way "home." About a mile from camp there was an extremely handsome salix, from which the snow had just melted, and it was bearing its pretty red catkins, but the leaves had not yet begun to appear.

A few minutes afterwards we reached "home." It was about ten o'clock and almost dark.

Had the next day been a fair one, I should have returned to climb the glacier again. With a good day and

without climbing another mountain first, I believe we could have gone over the top and the ramparts, too, comparatively easily or, at least, without undue hurry. So I was exceedingly disappointed to awaken to a cloudy morning.

Jo and Smoky had seen some goats the day before, so they went back to get pictures, while I started up a mountain to try and reach some high rocky ledges that contained a scanty vegetation. It was about 10 o'clock, but instead of improving the sky grew darker every minute. The outlook was very discouraging and in about an hour rain set in. *Draba lonchocarpa* and *Braya americana* were plentiful at 5,000 feet. A little higher up *Antennaria cana* appeared. It is a charming dwarf less than one inch high, previously known only in Newfoundland. *Erigeron aureus acutifolius*,* with a fine yellow flower 3-4 inches tall, grew in moist peat at 5,500 feet. *Epilobium alpinum* was plentiful, too.

At first the rain came down mildly, but soon it came in torrents, and with it a bitter, cold wind. We had become so accustomed to rain that we paid no attention to it. We reached a high basin, but long before this the rain had turned first to sleet and then to snow.

The whitening mountains, the great glaciers, and then beyond them the black, rocky peaks whose jagged summits were buried in the soft, low clouds that formed the ceiling, were the only things that counted here.

The rain had run in trickles down my neck and back, most of the morning, and snow was in my hair and every crease of my far too thin jersey. Who cared? Discomforts seem of so little importance in a place of such magnitude, one does not notice them.

*Raup new var.

I felt so small, so utterly unimportant that no personal discomfort mattered at all.

The rain, snow and sleet rendered the plant press useless, and aside from that my hands were too numb from the cold to handle it. A few prostrate salices, now and then a silene, occasional saxifrages and tufts of various alpine grasses were scattered among the stones, and not much else. The clouds were slowly descending into the valley. In a little while the dank, thick mist would have settled and it would have been hard to see even the ground we were walking on. Fate seemed against us and again we turned before we wanted to. It was still snowing, so, needless to say, we covered the ground, slipping and falling, as fast as we could. We reached home at a late hour and, having no cook tent, we ate our meals under, or rather part way under a "fly" which though it sheltered us from one direction did not keep out the rain.

The following day, August 3rd, was cold and dark again, and the clouds were so low we could only see a short distance away. It was useless even to think of going up the valley again, so my last chance to climb the big glacier and look over the rocky ramparts was gone. There was nothing left for us to do but return, for this was the end of our journey.

Probably we shall never come this way again. Only the old billy-goat, whose home is on the great bleak mountain, Mt. Lorraine, will likely visit it for some time to come. McCusker named this mountain for Smoky (Lorraine Neighbor) because a geological upheaval had formed a huge S on its side. Before leaving I returned to where the willow with the red catkins was growing, to obtain a few small plants for my cans, which did not take long. The horses were

brought in promptly and soon we were on the homeward trek. Scratched and torn again, we were welcomed at Redfern Lake that afternoon by Ben, who said the weather had been fair! The waves were breaking noisily on the pebbly beach and the sun was shining brightly. I turned around and looked up the valley, but the mountains were barely visible through the clouds.

The next day, although cloudy at first, soon cleared. I climbed a mountain north of the lake. There was a tiny green leaved antennaria, *A. monocephala*, that grew in peat near a spring, at 6,000 feet. This was a charming, diminutive thing, the height of whose flower stalks was only one inch. There were two plants of an interesting and very pretty *Polemonium* sp. which grew in the same place. Little vegetation was above this, for the upper part of the mountain was composed of solid rock and loose stones.

But the climb was worthwhile for the joy of the view alone, as I could see away beyond the Prophet River in the north. We came part way down into a valley and then climbed again to a big, high, flat topped mountain or plateau, that lay just north of the eastern end of the lake. We found ourselves on an interesting high tableland, quite flat, except for huge eroded boulders, which looked as if they had been dumped there, in quite an unexpected fashion. Strange to say, there were few flowers, except an occasional myosotis, aconitum or saxifrage.

We descended toward the east through a wonderfully beautiful little green valley. Every attractive feature that a mountain valley should possess seemed to be there; great rocks, myriads of gorgeous flowers, those already mentioned, also erige-

rons, castillejas, etc., in lavish array, and a mirror-like small lake from which sheep and moose trails led in every direction. When we came to timberline the trees were sweet, tidy, adressed specimens of *Picea*, and then as we descended to a lower level we came to magnificent ones, that grew extra large in this protected valley. The usual little rippling creek drained it and on the south side the mountain rose with great perpendicular cliffs. Hurrying on we reached camp about 7.

I was sorry to leave Redfern Lake, which we did the following day. It was a glorious morning, but, even so, there was a filmy cloud hovering over the mountains in the west, whence we came.

An eighteen mile ride brought us to the shore of a small lake beside which we had camped in 1931 and called "Dirty Lake" because it was impossible to collect even a cup of water without including the occupants of the lake, small red bugs. This caused us the inconvenience of going a long way off to a stream for clean water.

August 6th we were delighted to see a bright sunshiny day, for we were going to climb a mountain. I know McCusker was particularly glad, for the mountain was Mt. McCusker. We scattered from camp about 9.

The climbing at first was slow and tedious owing to fallen timber. The forest must have burned many years ago, for a new covering of large trees clothed the mountain. *Viola nephrophylla* was growing plentifully in a moist place. In a couple of hours we came to timberline, where the grassy slopes were aglow with myriads of flowers including *Solidago multi-radiata*, a pretty little golden rod only two inches high, *Valeriana sitchensis*, *Myosotis alpestris*, the dwarf form of *Aconitum delphinifolium*, etc.



Mary G. Henry

From the summit of Mt. McCusker

As usual I wore no hat, for I like the feeling of the wind blowing freely through my hair. A short sleeved cotton shirt permitted me to enjoy the delicious warmth of the sun shining unrestrainedly on my arms and neck.

We climbed steadily on up the steep incline for about three hours, without a halt, when we came to a bank of snow. A trickle of water from beneath gave us a much needed drink. It was well past noon, so we sat down and ate our sandwiches.

The buzz of mosquitoes soon disturbed the quietude. McCusker gathered a few dry twigs shed by some dwarf, stunted willows and built a small fire right beside me. When it was well started he put bits of moss on it in order to make a smudge. Then, gracious me, he added handful after handful of *Dryas integrifolia*! Poor beautiful dryas, with its spotless white golden centred flowers, and its dainty green foliage, was it ever used

so roughly before? But the mosquitoes were vanquished and the enchanting stillness of the mountains was about me again. I could now enjoy the wondrously beautiful panorama. Great mountains were everywhere until they disappeared away off into the pale blue sky. Only the big ones around Redfern Lake stood out conspicuously. Mt. McCusker extended from our feet down its splendid, almost unbroken slope, to the valley below. All was peaceful, all was still.

I stretched out full length on the soft rocks; my body just seemed to fit into the contours of the small space I occupied on the mountain-side. I laid my head down on my bare arm and was then entirely comfortable. Soon I felt myself drifting into a delicious state of semi-consciousness. Suddenly I looked up and wondered, for a second, where I was. It was such a grand feeling to awaken and find myself on a mountain, just

where I would rather be than anywhere else in the world. Time was precious, my conscience smote me, but my watch told me only about ten minutes had passed by.

After a long unbroken stiff climb over stony slides and bare rocks, among which I found petrified coral and fossilized sea shells, we reached the summit, altitude 6,400 feet. The view was magnificent, of course, no matter which way we turned.

The descent was made without a stop until we reached a curve of the river. The water was rippling noisily over the rocks. As we walked along the edge of the river the banks rose steeply, so we climbed over rock cliffs about twenty feet above the water. Below were pools of that marvelous dark green that only clear deep water can show, and the bottom of white sand showed plainly. Along the shore the big rocks were broken in places and formed high walls on either side of tiny sand beaches. I was very warm and the cool, clear water seemed the most alluring I had ever seen. It was about 6 when we returned.

We spent the next two days on the trail on our way to Caribou Pass, where after riding through a heavy shower we arrived early in the afternoon of August 8th.

We had intended crossing over to the far side of the Pass before we stopped for the night. When we came close to timberline, where Mt. Kenny towers high overhead, and *Abies lasiocarpa* grows in small, stunted, picturesque clumps, and a crystal clear stream runs down the valley, it was too much for the flesh and blood that was I. I succumbed to the lure of this enchanting spot, and camped for the night with *Cassiope tetragona* for my bed. Across the stream, and just opposite our tent, the grassy bank rose steeply. There was a slight de-

pression and in it, sheltered somewhat from prevailing winds, was gathered a charming galaxy of mountain flowers.

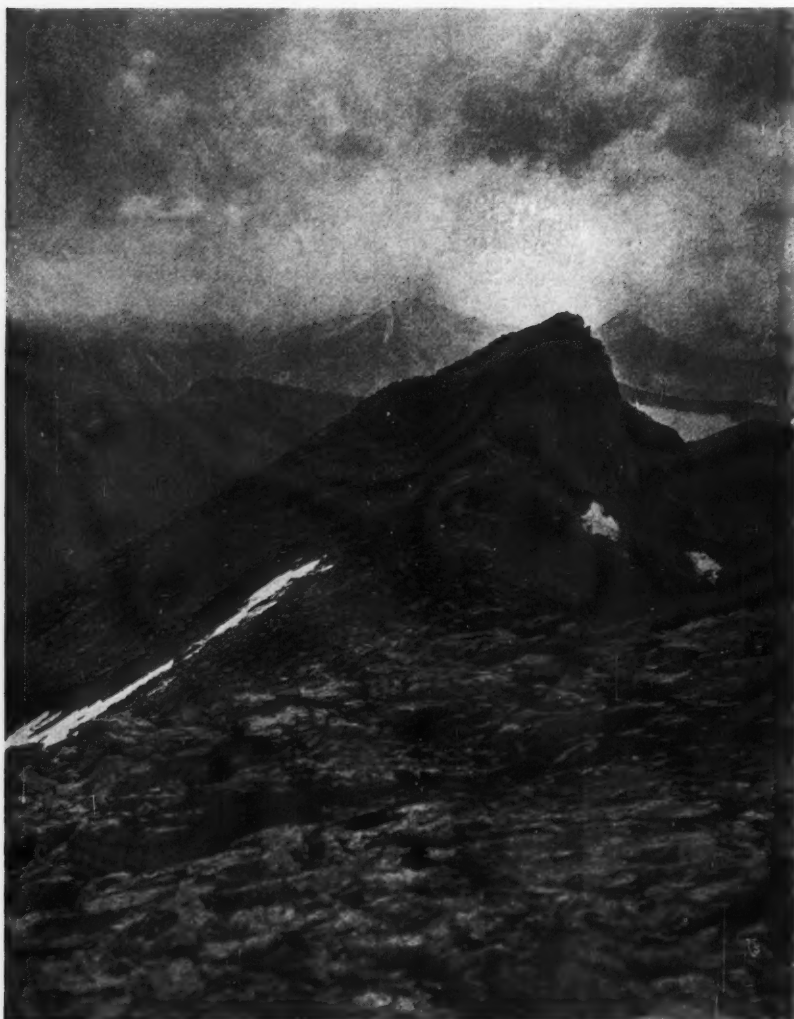
After unpacking we crossed the stream. We found, to our delight, that bees of many kinds were buzzing merrily over the flowers. As the Academy of Natural Sciences had specified to Jo that they were particularly interested in bees, especially those from high altitudes, she decided on a little "beeing" expedition.

I left all plant collecting paraphernalia behind, determining to concentrate my energies on bees alone. It was really great fun chasing them over these beautiful flowery banks and alpine meadows. Sometimes she took the bug net and sometimes I did, but we used handkerchiefs, too.

We caught lots of them, and many were different from any we had ever seen before. There were enormous ones, and several cute little ones in addition to those of medium size. Some were clothed with orange colored fuzz, some with white fuzz, and others wore a copper colored fuzz. A few were quite modern and wore fuzz in two colors! We never dreamed bees could be so varied and so pretty. All the while I could not help casting an eye at the flowers, for they were even more beautiful than the bees.

Suddenly a sweet, familiar bird song drifted across the meadow. Could it be? Yes, it *was* a robin and no mistake, for we followed the direction whence it came until we saw a mother robin flutter from her nest in a stunted *Abies lasiocarpa*. Her mate was nearby. High up in the Caribou Pass, these little birds of our homeland seemed strangely out of place, and we wondered what brought them there. Perhaps they, too, were wondering why we were here.

When Jo counted the bees that



Mary G. Henry

Looking northwest from the summit of Mt. Kenny

night after supper, she found there were eight different kinds.

Next day we climbed Mt. Kenny. We started off about 9. I had a wonderful day, miles of alpine mead-

ows and then more miles climbing up over rocks, and then a grand view from the snowy summit, altitude about 7,500. It was about 5 when we returned. Supper tasted good



Mary G. Henry

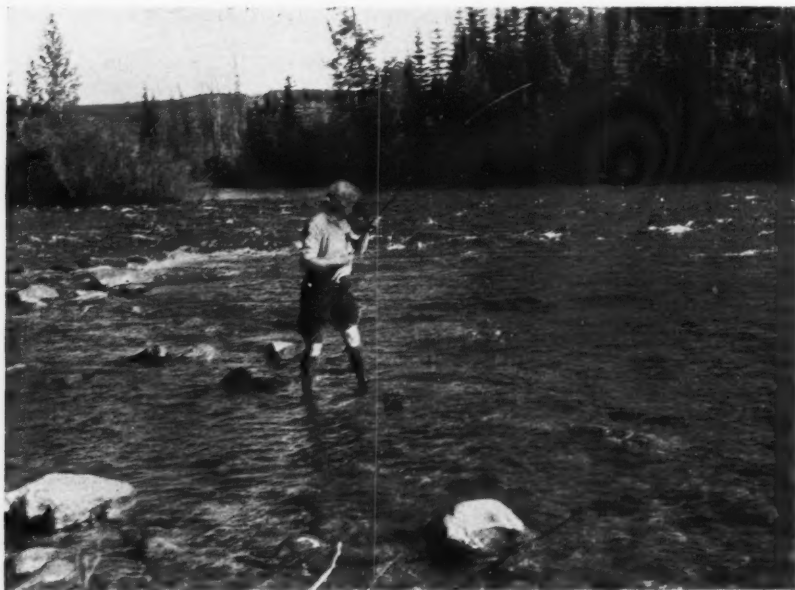
Looking southeast over Caribou Pass from Mt. Kenny

after a bath in the clear little pool by our tent.

We spent the next two days travelling southward, and twice we ran across Indians. I stopped once to dig

up some little plants of *Primula egaliksensis*. In one place, altitude 4,500, we passed a bush of *Sorbus sitchensis*.

We camped on the Graham River



Josephine Henry

Evening fishing on the Graham River

the afternoon of August 11th. The sun, which had been rather conspicuous by its absence this season, was shining brightly. We enjoyed a brief swim in the river, temperature 54, the warmest water we bathed in so far this summer, and it felt very pleasant indeed. Supper was ready early and just as we were about to leave the tent, an Indian rode up and joined us. Brass buttons on his coat denoted his rank, a member of the Council. He accepted an invitation to supper and said he had seen our tracks and followed us.

Jo and I retired to our tent, where later on we were joined by the Chief, quite a pathetic figure with a sad face, slightly built and poorly clad. He was much interested in the Victrola, listened intently, and could scarcely take his eyes off it. I tried

to think of something to give him—one carries few extras on these trips—but remembered I had a good sized pocket knife on rather an unusual chain, and when I gave it to him his dark face beamed with pleasure. He left soon after, saying that if we ever needed anything in his country to ask for Antoine Hunter. I wondered whom we would ask!

We were on our way next morning at 5:45. Smoky decided to sleep right on the trail for, as we were only about a week from Hudson Hope, he was afraid the horses might bolt for home. I heard him on his feet several times during the night, chasing back the horses, and felt sorry for him when I heard the rain pattering on our tent at 4. But Smoky was worthy of his trust and we did not have to walk home. It



Josephine Henry

Pale lavender form of Delphinium scopulorum glaucum near Graham River

was still raining after breakfast, but we packed up and rode all day with no change in the weather.

The day following was no better, but the 27 miles, over eight hours in the saddle, were not unpleasant. The scenery was all beautiful—even the

rain could not spoil that. A twenty-five mile ride next day brought us to Aylard Summit.

August 15th dawned cold and clear. As I stepped from my tent and saw the beautiful blue sky overhead, and the wondrous sea of flow-

ers before me, the sun seemed to shine with an extra brightness. The gift of a clear day on this, my birthday, was the best possible gift I could have. I was most grateful.

The aconitums and delphiniums seemed to outvie each other in prodigality and brilliancy of bloom, and they waved their royal colors royally. We were encamped at the foot of the mountain I climbed on September 14, 1931, and I was going up it again. The horses were due a day's rest, and I was to have my last climb of the year.

We ascended from a different direction this time, and as the season was a month earlier it was like climbing an entirely different mountain. We made our way as quickly as possible up through the forest. *Rhododendron albiflorum* was in full bloom and its pretty bell-like, white flowers drooped from every branch. The way was very steep and an exceedingly dense growth of *Betula glandulosa*, just over my head, made it one of the most difficult places to penetrate I was ever in. I lost McCusker, when I strayed to collect plants, and although I called as loud as I could, he did not answer. I had no idea where he was or, indeed, where I was, either, as I could scarcely see more than a few inches ahead. Pushing and shoving my way up through this miniature thicket and getting scratched all the while was no joke, and I was scarcely able to make any headway. I struggled for what seemed a long time through this dreadful tangle of bushes, and was very thankful when suddenly I stepped out into the sunshine again at timberline, with nothing higher to see over than a prostrate juniper. McCusker had stationed himself on a prominent rock so I could not fail to see him.

For a while the climbing was

"smooth sailing," as we made our way over the alpine turf. There were many ripe blueberries, and as they were sweet and good our ascent was delayed. A few bushes of *Rhododendron lapponicum* were here, which I had not seen last year.

It was well past noon by the time we climbed over the steep, jagged mass of rocks that led to the summit. The sky had clouded over and the air was cold. I had miscalculated, for, thinking the sun would shine all day, I had left my jersey behind. Therefore I found it too cool to sit and enjoy my sandwich. The view was grand, of course, and the dark clouds overhead added to the wildness of the picture, and I feasted my eyes with avidity on every mountain top in sight.

I bid goodbye to the great "hills" amongst which I had spent many happy days again and under whose shadows I had slept many happy nights. My feelings were strangely mixed. Pleasure and thankfulness at being here and distress that this was the last climb of the year. I did not hurry on the way down, for the sun soon shone again and I lingered, loitered and explored, wandering many miles until it was time for supper.

Next day, after a twenty mile ride, we camped once more beside the Peace River. When Jo and I went down to swim we found two snakes about 30 inches long playing in the water. I caught one but let it go. *Rosa acicularis* and *R. Woodsii* were both conspicuously in evidence, by reason of being covered with their handsome red fruits, in nearly every sunny meadow. *Disporum trachycarpum* grew about 18 inches high in rich woodlands, and their orange scarlet three lobed berries hanging showily

amongst the lush green foliage. *Delphinium scopulorum glaucum* was developing its seed pods, and these were especially tall. One stalk, measured by McCusker, was 9 feet 3 inches.

Aster foliaceus, however, provided us with a truly magnificent floral display, the most showy display I ever saw made by a composite. There were literally acres of it in full bloom, and scarcely a leaf was visible amongst its thousands and thousands of large, soft lavender blue flowers.

Prunus pennsylvanica, usually a tree of 15-20 feet, in some places could be seen fruiting at but 18 inches.

We rode through some fine spruce trees, but *Populus tacahamaca* and *P. tremuloides* formed most of the forests.

Cornus stolonifera grew plentifully in many places in sun or shade. The bushes were abundantly decorated with their showy white fruits. Suddenly my wandering eyes were arrested by a cornus which was carrying handsome clusters of beautiful fruits richly stained with blue. I dismounted and soon had a few roots packed carefully in my cans.

That evening we camped at a place called "Cust's House" and marked as such on some maps. The "House" has long since disappeared. There

are, however, two empty sheds near the Peace River, and it is a well used camping ground.

The next night we camped in Hudson Hope.

On our trip this summer we covered over 460 miles on horseback and climbed 7 mountains on foot (over 100 miles) during the past 5 weeks.

I enjoyed every minute.

I basked in mid-day sunshine. I swam in icy lakes and rivers, rode through torrents of rain and climbed mountains in snow and storms. To anyone who loves this country as I do, the working of the elements adds to the enjoyment and excitement of the day, and when the sun emerges from the clouds, it seems a little brighter than ever before.

Once again the time came to say "Goodbye" to Chum. "Au revoir," I hoped it was. Once again my arm encircled his great black neck, as far as it would go. One more kiss against his soft dark face, and then he galloped away. The thud, thud, of his hoofs dying off in the distance still left me standing.

I scarcely heard the puff, puff of the noisy outboard motor, as the little skiff carried us quickly on our journey down the river. After that came a motor ride, and then the train. The whistle screamed, we started south, but my heart was in the "hills."

The Correlation of Classification and Distribution in *Zephyranthes*

H. HAROLD HUME

The genus *Zephyranthes*, as now interpreted, is divided into three rather loosely connected subgenera and in a very definite way there is a relation between these groups and the areas in which the species composing them are found. Up to this time, beyond indicating the nativity of the individual species, no consideration appears to have been given to the geography of the genus as a whole. Over a period of more than a century, a number of classifications have been presented and the one now commonly accepted, that by J. G. Baker (1888), is based upon and has been evolved from earlier ones. It is advisable, therefore, to review these groupings as a basis for a discussion of the morphological, geographical distribution relationships of the subgenera.

CLASSIFICATIONS OF ZEPHYRANTHES

Herbert (1821) proposed the genus *Zephyranthes* (literally "Flowers of the West Wind") for certain of the bulbous plants known in pre-Linnaean days as *Lilio-narcissus* and classified by Linnaeus under *Amaryllis*. He divided the genus into two sections, (1) *Uniflora spatha integra* and (2) *Biflorae spatha divisa*. Although afterward he placed several species in the genus, none of them had two-flowered scapes. In 1837, Herbert definitely excluded from the genus all species with more than one flower to a scape and divided it into (A) *Pedunculated* and (B) *Sessile* sections. At the same time, in his discussion of their characters, he made a new genus *Argyropsis* with what is known commonly as *Zephyran-*

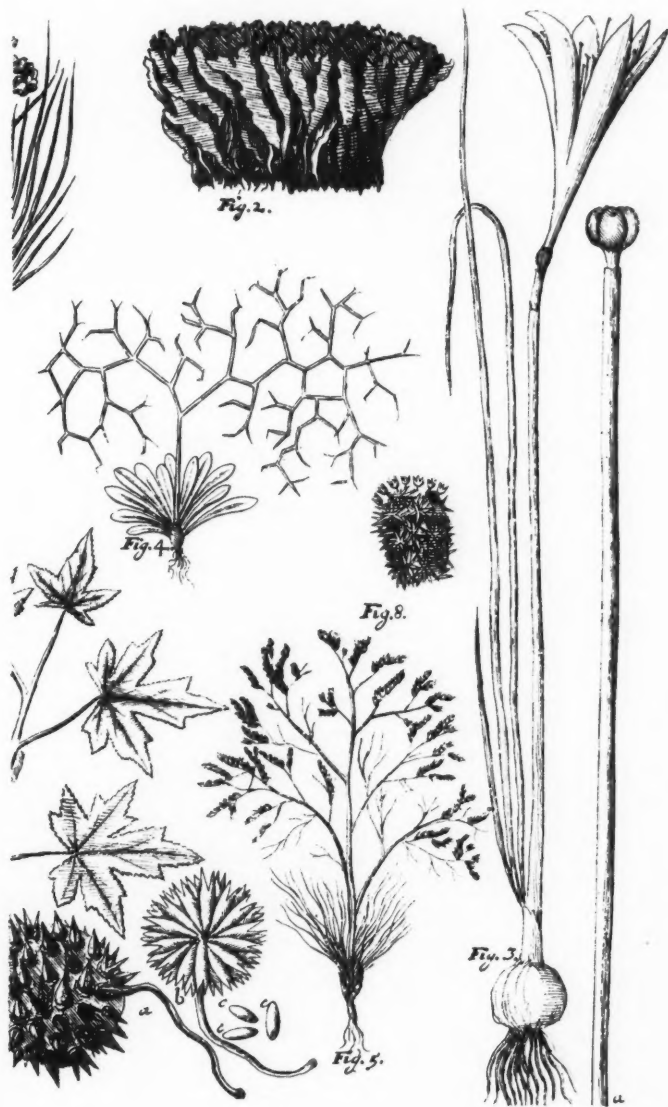
thes candida as the only species and suggested another genus, *Zephyrites*, to include certain forms with single-flowered scapes that he had placed previously or at the same time in his genus *Habranthus*.

Roemer (1847) accepted Herbert's 1837 classification of *Zephyranthes* and his genus *Argyropsis* while Kunth (1847) also followed Herbert except as to *Argyropsis* which he used as a subgenus or section.

Baker (1878) in his first classification of the species of *Hippeastrum* included all *Habranthus* in that genus and adopted Herbert's proposed generic name *Zephyrites* for a section made up of plants formerly placed in the single-flowered scape section of *Habranthus*, by Herbert, Kunth and Roemer.

Bentham and Hooker (1883) made another classification in which they followed Baker in part. *Habranthus* with scapes having more than one flower were left in *Hippeastrum* where they still remain, while *Habranthus* with single-flowered scapes (Herbert's suggested *Zephyrites* and Baker's section *Zephyrites* in *Hippeastrum*) were placed in *Zephyranthes*. *Argyropsis*, established by Herbert (1837), was returned to *Zephyranthes* and the plants included in Herbert's genus *Pyrolirion* were disposed of in the same manner.

Baker (1888) accepted the Bentham and Hooker classification and *Zephyranthes*, as he then interpreted it, included Herbert's suggested *Zephyrites* as well as the genera *Argyropsis* and *Pyrolirion*. However, he divided the genus into three sub-genera. The first of these was designated *Zephyranthes*



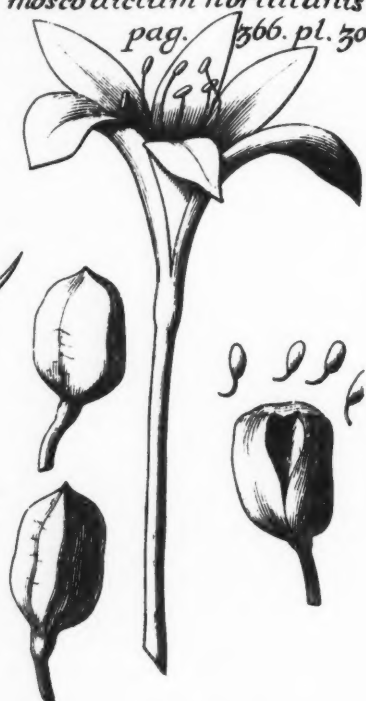
At the right an illustration of *Zephyranthes Atamasco*. Plunkenet, Leonard.
Almagestum. p. 200 t. 42, fig. 3. London, 1696.

S. HEXAPE TLÆ.

*Narcissus minimus calice
mplo plano nobis Bulbo-
odium tenuifolium, L.B.
habr. pag. 422.
pl. 8.*



*Lilionarcissus Indicus pu-
mitus monanthos albus foliis
angustissimis, nobis. Ata-
mosco dictum hortulanis
pag. 366. pl. 30.*



*The Atamasco Lily (right) as figured in Plantarum historia universalis by
Morison, Robert. Volume 2, Appendix, Sect. 4, Tab. 24, 1860.*



Zephyranthes Atamasco from Catesby, Mark. *The Altamusco Lily. Natural History of Carolina, Florida and the Bahama Islands.* p. 112. Pl. 12, 1771.



Zephyranthes Atamasco in Cracker Swamp in Pellicier Creek Area.
Feb. 10, 1935



Zephyranthes candida



Zephyranthes carinata, from Haage & Schmidt, Erfurt, Germany.
Hume garden, July, 1934

proper, and for the other two Herbert's names, Zephyrites and Pyrolirion, were adopted. Holmberg (1905) gave the name *Euzephyranthes* to Baker's sub-

genus, *Zephyranthes proper*. There at this time the classification rests. Since Baker's classification the only general attempt at indicating relationships with-

in the genus *Zephyranthes* has been that of Holmberg (1905). Unfortunately certain details are lacking in descriptions of species not included in the Baker and Holmberg lists, so it is sometimes difficult to place a plant in its proper sub-genus. However, sub-generic lists are presented herein embracing most of the authentic species known at this time.

GEOGRAPHICAL DISTRIBUTION

Zephyranthes is an American genus, and the type species, *Z. Atamasco*, bears an Indian name. Some of its species are native in (1) the United States from Virginia to Florida and westward into Alabama and Mississippi*; (2) members of another group Mexico; (3) a considerable number occur in Texas†, Arizona and New cur in Mexico and Guatemala; (4) a few appear to be native in northern South America; (5) several belong to the West Indies; (6) a number are found in Peru and Bolivia, (7) while the species in the great area made up of parts of Chili, Argentina, Uruguay, Paraguay and Brazil are very numerous, with many probably undescribed. From this it will be seen that the geographical range of the genus is greatly extended and more or less continuous all the way from Virginia to Argentina except for Central America, northwestern South America and the great forested equatorial region east of the Andes. With such wide distribution it is but natural that a genus of approximately sixty plants should present considerable variation in the morphological characters of its species.

* Charles Mohr in *Plant Life of Alabama Contributions from The U. S. National Herbarium*. Vol. VI, July, 1901, includes Louisiana in the range of *Z. Atamasco* but the writer has not been able to substantiate this definitely.

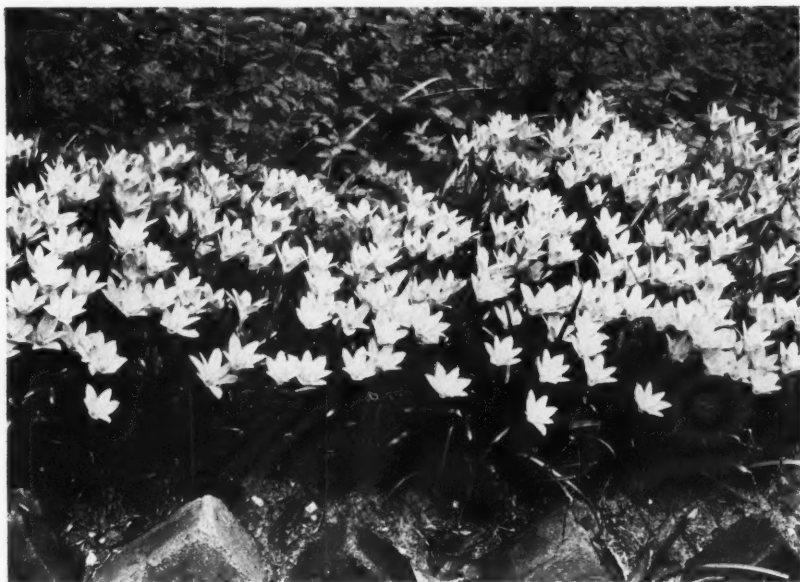
† Whether *Z. Texana* extends as a native into Louisiana is in dispute.

CLASSIFICATION AND DISTRIBUTION

What then is the relationship of the subgenera *Euzephyranthes*, *Zephyrites* and *Pyrolirion* to the seven areas making up the great region in which species of *Zephyranthes* are distributed naturally? In these regions botanical explorations are by no means complete and much still remains to be learned. However, it is a safe assumption that what is known now presents a fair cross section of their characters and distribution. It is well to hold in mind, in discussing this, that these plants are beautiful garden subjects scarcely modified by the hand of man and yet man has had a part in their distribution. Some species are known only as garden plants, others of known nativity are widely distributed as garden plants and many undoubtedly have become feral in areas similar in soil and climate to those in which they are endemic.

SUB-GENUS EUZEPHYRANTHES HOLMBERG

The sub-genus *Euzephyranthes* Holmberg (*Zephyranthes* proper Baker) is characterized by erect flowers slightly connivent stamens in two lengths, the shorter ones alternating with the longer. The anthers are versatile, the petals slightly narrower than the sepals, but otherwise much the same in size and shape. To this section belong all the species native in the United States (Regions 1 and 2) with the exception of *Z. Texana*, all native in Mexico and Guatemala (Region 3), northern South America (Region 4) and in the West Indies (Region 5). The northern areas in which *Euzephyranthes* occur form a rough circle embracing the great extent of territory from Florida around the Gulf of Mexico, through Texas, Mexico and Guatemala along parts of northern South America and back by way of the



Zephyranthes rosea in garden of Mrs. Gilbert Taylor, Gainesville, Florida

West Indies to Florida, the great Caribbean-Gulf of Mexico rim, with extensions northward from Florida to Virginia (*Z. Atamasco*) and west from Texas into New Mexico and Arizona (*Z. longifolia*). In southern South America (Region 7) representatives of this subgenus also are found together with species of the sub-genus *Zephyrites*. Herbert's section *Pedunculated* is represented in all the areas while his *Sessile* group apparently is confined to Mexico and Guatemala.

Mexican and Guatemalan *Zephyranthes*, with a single possible exception, are known to be native only in portions of those countries east of the mountain ranges that form the continental backbone. Brandegee (1889) described *Z. arenicola* from Magdalena and Santa Margarita Islands lying adjacent to the southwest coast of Lower California.

Of it he said, "Described from cultivated specimens, the plants in their native habitat being long past bloom in January." With the lone exception of this isolated species no *Zephyranthes* has been described from the Western coast of North America and in connection with it the question naturally arises, did the cultivated plants come from the wild or did feral plants come from the cultivated and is the plant actually native elsewhere?

The monotypic genus *Argyropsis* Herb., (represented by *Z. candida*) now classified in *Euzephyranthes*, has erect flowers, erect stamens with erect (not versatile) anthers, strongly declinate styles and capitate stigmas. The leaves are erect, rush-like and perennial. It is known to be native only along the LaPlata River, though widely distributed in cultivation. It is said that when



Zephyranthes Simpsoni. East of Brewster, Florida. February 23, 1935.

the river was discovered by Juan Diaz de Solis in 1515 the name Rio de la Plata (The Silver River) was given because of the abundance of the silvery white flowers of *Z. candida* along its banks, and the name Argentina likewise is credited to the same circumstance.

Approximately thirty-five species are placed in the sub-genus *Euzephyranthes* as follows:

Z. arenicola Brand. — Lower California

Z. Atamasco (L.) Herb. — Southeastern United States
Z. Bakeriana Morong. — Paraguay
Z. bifolia (Aub.) Roem. — Santa Domingo
Z. brevipes Stand. — Mexico
Z. candida (Lind.) Herb. — La Plata River
Z. carinata Herb. — Mexico
Z. chrysantha Greenman and Thompson — Texas
Z. citrina Bkr. — Guiana
Z. Commersoniana Herb. — Argentina



Zephyranthes Treatiae from north end of Neunan's Lake, Alachua County, Florida, along the Orange Heights Road, January 20, 1934.

- | | |
|---|--|
| <i>Z. concolor</i> Lind. — Mexico | <i>Z. lilacina</i> Speg. — Argentina |
| <i>Z. Conzatti</i> Greenman — Mexico | <i>Z. Lindleyana</i> Herb. — Mexico |
| <i>Z. Cubensis</i> Urb. — Cuba | <i>Z. longifolia</i> Hemsl. — Texas, Mexico, Arizona, New Mexico |
| <i>Z. depauperata</i> Herb. — Chili | <i>Z. longistyla</i> Pax. — Argentina |
| <i>Z. entrariana</i> (Hoffm.) Pax — Paraguay, Argentina | <i>Z. macrosiphon</i> Ekr. — Mexico |
| <i>Z. erubescens</i> S. Wats. — Mexico | <i>Z. mesochloa</i> Herb. — Argentina |
| <i>Z. filifolia</i> Herb. — Patagonia | <i>Z. minima</i> Herb. — Brazil |
| <i>Z. Hieronymi</i> Pax. — Argentina | <i>Z. oxipetala</i> Speg. — Argentina |



Zephyranthes Treatiae. In the city limits of Jacksonville, near the Chamberlain greenhouses. March, 1928.

- Z. Nelsonii* Greenman — Mexico
- Z. pulchella* Smith — Texas
- Z. rosea* Lind. — Cuba
- Z. Simpsoni* Chapm. — Florida
- Z. tepicensis* Greenman — Mexico
- Z. Treatiae* S. Wats. — Florida-Georgia
- Z. tubispatha* Herb. — West Indies
- Z. verecunda* Herb. — Mexico
- Z. Wrightii* Ekr. — Cuba

SUB-GENUS ZEPHYRITES HERB.

Zephyrites Herb. contains species found only in southern South America (7) with the exception of *Z. Texana*. This sub-genus is separated from the other sub-genera by its declinate flowers, perianth parts in four sizes (two pairs and two odd), declinate, recurved,

rather fasciculate stamens in four different lengths divided 1-2-2-1, style declinate, recurved, with the stigmas approximately in the same plane as the anthers. *Z. Texana* is an isolated species closely related to *Z. Andersonii* from Argentina. It was collected by Thomas Drummond during his botanical explorations in Texas 1833-34 and was named and described by Herbert (1836). Since all other species belonging to the sub-genus *Zephyrites* are native only in southern South America can it be possible that *Z. Texana* was introduced into Texas long ago, perhaps by some Spanish missionary during the period from 1690 to 1793 in which the Franciscans established twenty-five missions in Texas? Or is it an instance of a plant growing in



Zephyranthes tubispatha, vivid green at base, pure white above, though showing slight pink tint on fading.

much the same environment as its near relatives but separated from them by many thousands of miles? In favor of the former suggestion it may be pointed out that several species of *Zephyranthes* in situations adapted to their growth have become feral in different parts of the world. Of the four Texas species, *Z. Texana* and *Z. longifolia* have been known longest. *Z. longifolia* is native not alone in Texas but extends into New Mexico, Arizona and Mexico, while *Z. Texana*

has not been reported from South of the Rio Grande. The Mexican *Z. concolor* S. Wats. placed by Baker (1888) in the sub-genus *Zephyrites* does not belong there. Its erect flowers and erect filaments in two sets of alternating lengths place it definitely in the sub-genus *Euzephyranthes*.

Approximately fifteen species are placed in the sub-genus *Zephyrites* as follows:

Z. Andersoni (Herb.) Bkr. — Uruguay



Zephyranthes verecunda, from Haage & Schmidt, Erfurt, Germany, labelled *Z. rosca*, July, 1934.

- Z. andicola* (Herb.) Bkr. — Chili
- Z. caerulea* (Griseb.) Bkr. — Uruguay
- Z. cearensis* (Herb.) Bkr. — Brazil
- Z. franciscana* Herb. — Brazil
- Z. gracilifolia* (Herb.) Bkr. — Uruguay
- Z. jujuyensis* Holmb. — Argentina
- Z. melanopotamica* S peg. — Patagonia
- Z. mendocensis* Bkr. — Argentina
- Z. porphyrospila* Holmb. — Argentina
- Z. robusta* (Herb.) Bkr. — Argentina

- Z. sylvatica* (Herb.) Bkr. — Brazil
- Z. Texana* Herb. — Texas
- Z. timida* Holmb. — Argentina
- Z. versicolor* (Herb.) Bkr. — Uruguay

SUB-GENUS PYROLIRION HERB.

Species classified in the sub-genus *Pyrolirion* are characterized by a bilateral spathe, erect flowers, the tube dilated upward into a throat, stamens attached at the middle of the tube, the anthers strongly crescent shaped, curled in drying and for the most part pa-



Zephyranthes Texana, produced from flowers received from James L. Gebert, New Iberia, La. It appears to be identical with what I have from Kingsville and San Antonio, Texas.

pilliate stigmas, expanded and spatulate at their apices; a few have capitate stigmas. The group is very definitely localized, more so perhaps than any other one of the sub-genera. To such an extent is this the case that almost it may be assumed that any *Zephyranthes* reported from Peru and Bolivia belongs to the sub-genus *Pyrolirion* if it is native in that area. Specimens are re-

corded from Chili, but they may be from cultivated plants. Although none have so far been reported it is possible that this sub-genus is represented in northwestern Argentina.

The sub-genus *Pyrolirion* apparently contains twelve species.

Z. aurea (Herb.) B. & H.—Peru

Z. albicans (Herb.) Bkr.—Peru

Z. Beustii Schinz.—Peru



Zephyranthes robusta, bulb, leaves and flower.
Hume garden, June, 1933.



Zephyranthes cardinalis, grown from Bahama bulbs, May 9, 1935



Zephyranthes aurea, bulb from Jamaica. May 10, 1935.

- Z. Boliviensis* Bkr.—Bolivia
*Z. cardinalis** Wright.—unknown
Z. flammea (Herb.) Bkr.—Peru
Z. flava (Herb.) Nichols.—Peru
Z. gracilis (Herb.)—Peru
Z. parvula Killip.—Peru
Z. pseudo-colchicum Kranz.—Peru
Z. viridi-lutea Kranz.—Peru
Z. xiphopetala Bkr.—Bolivia

SUMMARY

The division of the genus *Zephyranthes* as now interpreted into three subgenera is the outcome of a number of attempts at classification over a period of more than a century.

Distribution of approximately sixty-two species placed from time to time in the genus is set forth.

A definite relationship between the present classification and the distribution of the subgenera is established.

*Placed in the sub-genus *Pyrolirion* provisionally. University of Florida, Gainesville, Florida.

Most species known at this time are allotted to the three sub-genera *Euzephyranthes*, *Zephyrites*, and *Pyrolirion*.

REFERENCES TO LITERATURE

- Baker, J. G. 1878. Jour. Bot. N. S. 8:80.
 ———. 1888. Handbk. Amaryll. 30-38.
 Bentham, B. and Hooker, J. D. 1883. Genera Plantarum. 723-724.
 Brandegee, Townsend S. 1839. Proc. Cal. Acad. Sc. Ser. 2. 2:205-206.
 Herbert, Wm. 1821. App. Bot. Reg. 36.
 ———. 1836. Bot. Mag. under t. 3842.
 ———. 1837. Amaryllidaceae. 170-178.
 Holmberg, E. L. 1905. Anal. Mus. Nac. Buenos Aires. 12: 102-119.
 Kunth, C. S. 1847. Syn. mono. 4: 1. 481-489.
 Roemer, M. J. 1847. Fam. Nat. Syn. Mono. 119-125.

Some Factors Influencing the Rooting of Cuttings of the Chinese Holly (*Ilex cornuta*)

By C. C. THOMAS

Within recent years several papers have presented information relative to the propagation of hollies. The Chinese holly, *Ilex cornuta*, has been briefly mentioned in some of them, but specific information, correlating the time of taking, the kind of cutting, and the best medium, has not been given.

There are several reasons why the Chinese holly should receive more attention, especially in the southern half of the United States and along the Pacific Coast. It is a handsome evergreen shrub, reaching a height of 10 to 20 feet and having large rectangular, lustrous, dark-green spiny leaves. The red berries are 50% larger than those of our native holly, and are borne in clusters in great profusion. Reports from California indicate that it will withstand the high temperatures and low humidity of the interior valleys better than any other species of *Ilex*. It has, although frozen back considerably, survived -17° F., in the vicinity of Washington, D. C. The pistillate plants set berries without pollination.

During 1927 potted plants of the pistillate form of this holly were grown in the greenhouse at the U. S. Plant Introduction Garden, Chico, Calif., and flowered under conditions which did not permit pollination. They set berries that were normal in color and size, but with infertile seeds. Later (1933) Zimmerman and Hitchcock, at the Boyce Thompson Institute for Plant Research, confirmed these observations

and recommended its use as a potted plant for the Christmas season.

Hollies are considered difficult to propagate, the seeds germinating over a period of 1 to 3 years from date of planting and cuttings requiring 3 to 4 months or more to root. Zimmerman and Hitchcock found that cuttings of the Chinese holly, taken at intervals from July 15 to September 16, 1932, were rooted from 80 to 100% by August 1, 1933, and that the best rooting took place in a mixture of 50% peat moss with sand. They also reported that some of the holly cuttings started to root in 21 days but that it was necessary to leave the material in the rooting medium three or four months to obtain a high percentage of plants.

During 1933 and 1934 cuttings of the Chinese holly were taken from time to time and placed in different media. The series was started each season with the new wood as soon as it was hard enough to stand up in the cutting bed. The cuttings were all taken from one tree and were of two kinds: The ordinary nodal cutting, about 4 or 5 inches long with 4 to 6 leaves and the heel cutting, made by pulling young side branches about 4 inches long so that a heel was obtained. It was found that the new growth was not hard enough to use until about June 20; by that time the youngest leaves had lost the reddish brown color characteristic of the earlier stages of development and had become dark green. Two different



Fig. I. A cutting of the Chinese holly, showing the development of two roots after 14 days in a peat and cinder medium. The cutting was made on July 13, 1934. Fig. II (right). A cutting of the Chinese holly showing the root development after four weeks in a peat and cinder medium. The cutting was made on July 13, 1934.

media were used, washed sand, and equal parts of German peat moss, and cinders.

The benches in which the cuttings were grown were covered with glass cases that were 24 inches high and had doors on one side the full height of the cases. The benches were heated electrically by lead-covered cables that were thermostatically controlled. The thermostat was set at 70° F., but it is doubtful whether it was in operation much of the time during June, July and August. There were short periods when the high prevailing atmospheric temperatures caused the temperature of the media to rise to 84° or 85° F., and that of the air above the cuttings reached 90° F. Twenty-five cuttings were used in each lot and they were

set to a depth of 1½ to 2 inches in the medium. Care was taken to see that the medium had plenty of moisture at all times. This is absolutely necessary in rooting holly cuttings since the drying out of the medium is sure to result in either failure or a low percentage of rooting and more time will be required.

The cuttings were examined at weekly intervals until rooting started. The roots were approximately one-eighth of an inch in length, as shown in Figure 1, when the first counts were made.

The reactions of the media are given in Table I. The reaction of the sand was near the neutral point while that of the cinders and peat had a low superacid reaction. The combination of cinders and peat was slightly less acid than either cinders or peat alone.

TABLE I.

pH Determination of the Media Used.	
Medium	pH
Sand	6.22
Cinders and peat (equal parts by volume)	4.41
Cinders	3.93
Peat moss (German)	4.07

A more uniform soil moisture was obtained in the peat and cinder medium than in sand. The peat holds the moisture and the cinder keeps the mixture from packing too closely.

TABLE II.

Rooting of heeled cuttings of *Ilex cornuta* taken at intervals during 1933 and planted in a cutting bed in sand.

Date made	First roots appeared in	Percent-age with roots	Final percent-age	Number of days
6-22-33	42 days	56	80	56
7-20-33	21 "	80	100	28
8-11-33	28 "	80	100	42
9-12-33	42 "	64	96	56
10-23-33	49 "	56	92	70

From the data in Table II it is evident that the best time to take cuttings

obtained in 1934 and given in Table III.

From the data given in Table III it will be observed that the results for the heeled cuttings in sand compares closely with those given in Table II. The heeled cuttings in peat and cinders gave slightly better results than those in sand. This table also shows that the nodal cuttings gave somewhat better results than the heeled cuttings in both media. The best results are shown to have occurred with nodal cuttings, taken in July and placed in a medium of equal parts of peat and cinders. With the combining of these factors 76% of the cuttings produced roots in 14 days and they were 100% rooted in 21 days. The amount of root development which had taken place in peat and cinders, in the July cuttings, at the end of 2 and 4 weeks is shown in the photographs. They also show that roots were produced both from the callus and on the stem above it.

Subsequent growth of the roots was more rapid and more fibrous in the cinders and peat than in the sand.

TABLE III.

Rooting of *Ilex cornuta* cuttings taken at intervals during 1934 and planted in a cutting bed in sand and in a mixture of cinders and German peat moss.

Date made	Sand				Cinders and Peat			
	First roots appeared in	Percent-age with roots	Final per-centage rooted	Number of days	First roots appeared in	Percent-age with roots	Final per-centage rooted	Number of days
6-21-34	42 days	52	84	56	—	—	—	—
7-13-34	21 "	80	100	28	21	84	100	28
8- 3-34	28 "	76	96	42	28	80	100	42
9-17-34	42 "	60	92	56	35	60	96	49
The data above are for heeled cuttings; that below for nodal cuttings.								
7-13-34	21 days	80	100	28	14	76	100	21
8- 3-34	28 "	80	100	42	28	80	100	35
9-17-34	42 "	60	96	56	35	72	100	42

of *Ilex cornuta* is during the month of July. Cuttings taken at that time were 80% rooted in 21 days and 100% rooted in 28 days. Those taken in June were apparently not sufficiently mature to give the best results. These facts are further substantiated by the results

The results obtained before and after July were more irregular, slower and in most instances a lower percentage of rooting occurred.

It is believed that the chief reasons for the quicker rooting in the peat and cinder medium is that a more constant

and even moisture supply was available for the cuttings.

In conclusion, it should be noted that while the best results were obtained by taking the cuttings in July and placing them in a mixture of equal parts of German peat moss and sand, the time may vary in different localities. The

condition of the wood is the essential factor involved in this case. The young leaves have a reddish brown color which later turns to a dark green, approaching that of the leaves of the previous season. The wood of the cutting is not in condition to give the best rooting until the leaves have made this change.

A Book or Two

The Gardener's How Book. Chesla C. Sherlock. The Macmillan Company, New York, 1935. 358 pages, illustrated, \$3.50.

This most useful book starts off with a most engaging foreword by the author, who claims it was written "in self-defense" in the hope that it might provide answers to some of the infinite number of questions gardeners have asked him, in person and by mail.

It is, therefore, planned with unusual care, great attention having been given to chapter headings, paragraph headings and even sub-headings. The written style is lucid and terse even to a fault. Every conceivable phase of beginning amateur gardening has been touched upon and these have been fortified by tables and excellent illustrations. If one wants to hunt for details to criticise they may be found, but that is true of any book, and in this case would probably be discovered only by one who would know enough not to need this kind of book!

Color and Succession of Bloom in the Flower Border. H. Stuart Orloff and Henry B. Raymore. Doubleday, Doran and Company, Inc., Garden City, N. Y., 1935. 256 pages, illustrated, \$2.50.

A recapitulation of the chapter heads gives the clearest idea of the plan and scope of this most interesting book. Design and Location, Background, Structure (arrangement), Selection of Plants, Succession of Bloom, Color, Problem of Shade, Planting Plan, Soil, Maintenance,

Plants for Various Purposes and Locations.

The book is written simply and clearly so that it may be used by the beginner to his great advantage and yet with such interest that the advanced gardener will find almost equal pleasure.

Truly Rural. By Richardson Wright. J. B. Lippincott Company, Philadelphia, Pa., 1935. 219 pages, illustrated, \$2.50.

This is a new edition of Mr. Wright's witty description of the purchase and development of his country home. Strictly speaking it is not a garden book, but in it gardeners will find much by implication, and if they really read, even more by persuasion. Those who should read it and fall under its charm, however, are those who have not yet discovered the country as a place to live while still maintaining their permanent address in town. They may feel at first that it would lead to their undoing, but eventually they might discover it a guide to a larger life.

Week End Gardening. By Sterling Patterson. The Macmillan Company, New York, 1935. 255 pages, illustrated, \$2.50.

This book is addressed to the gardener whose only time for gardening is over the week end, a large and ardent group. It is written from experience or perhaps even experiences. In plan, it follows the calendar, not only by months, but by weeks, winter planning, spring prepa-

rations, summer activities, autumn work, and harvests of both garden fruits and ideas. No one can spurn it as too technical or too slight.

Gertrude Jekyll—A Memoir. By Francis Jekyll. Bookshop Round Table, Northampton, Mass., 1935. 248 pages, illustrated.

American gardeners who have any knowledge at all of the development of gardens in England during the last quarter century know of Gertrude Jekyll and her singularly important contributions to the garden and horticultural world. Many of her books reached this country and the reviewer still recalls the growing excitement of reading the pages of "Wall and Water Gardens" for the first time.

The present volume with a pleasant foreword by Sir Edward Luytens and an introduction by Agnes Jekyll, gives one a view of the personal life and thoughts of Miss Jekyll which permits an even keener pleasure in her writings and a more acute realization of the forces that combined with her own gifts to make her so outstanding a figure. It is not a garden book; it is, rather, the life of a brilliant and gifted person who used the garden as one mode of expressing

her artistic impulses and who had a vivid desire that homes and gardens might be had by the many rather than the few.

The Garden Grows. By John F. Leeming. Harcourt Brace and Company, New York, 1935. 229 pages, illustrated. \$2.50.

This is a rather personal history of the development of a home and garden by an owner who had the wisdom to begin with a plan and to recognize the fact that in building a garden one is dealing with living materials that require even more understanding than do building materials.

What one will get from this British adventure, aside from pleasant reading, depends largely upon one's own personal equation. The important thing to be discovered is not so much a matter of plants and the ultimate results in this particular place, but the principles and motives that actuated the procedure. These are there, not baldly and didactically as in some texts, but clearly enough for anyone—giving one not a pattern for operation but an understanding that should help if one is about to embark on a similar undertaking.

The Gardener's Pocketbook

Plant Collecting

With the general awakening of recent years to the need for conservation, this word collecting may need explanation. The one sure thing about wild flowers is that stands of the same plant or of the same colony of associates do not persist for many years in the same place except perhaps in regions of somewhat stable climatic conditions.

In the Rocky Mountain Region they are subject to extremes of heat and cold, of aridity and torrential rains, and to being overgrazed, all tending to make plant succession unstable. One glade dotted with yellow lady slippers like so many pats of butter in the dappled shade of aspens now has to begin all over again on a foot deep layer of eroded soil and gravel washed in by a heavy rainstorm.

The only plentiful stand we've ever found of *Aquilegia saximontana* (brevistyla) was on Pike's Peak where between bloom time and seed ripening a few thousand sheep poured down the steep slope. The first few hundred cut off the plants with their sharp little trotters and by the time they had all gone ba-a-a-ing down into the meadow they had slithered down enough gravel to cover deep our precious *Aquilegia saximontana*.

Unthinking vandals are rightly blamed for the depletion of many native species but the credit (or debit) isn't all theirs. Due to these and other causes, certain wild flowers are disappearing rapidly. To save the shy ones among these from complete annihilation it becomes urgently necessary to secure sufficient plants and seeds for propagation of these species. Hence the collecting is done with a solicitous interest in the colonies from which they are taken. A long-period conservation program is all that can save much

of this high-plains region from the fate of the southwest, deserted by the Indians when the surface of the land blew away after vegetation was depleted.

On these collecting trips we collect herbarium specimens, seeds and plants, information as to habitat soil and other conditions. We take photographs, make notes of locations where seed may be gathered later. The possibility of finding a new plant or a new species or a good "break" is the carrot in front of the donkey's nose but it doesn't take ingenuity to think up a good reason for a day or two in glorious scenery, exhilarating air and unsurpassed flora.

K. N. MARRIAGE.

Colorado Springs, Colo.

Two Fine Native Prairie Flowers

The prairies boast of many beautiful flowers which would enrich our gardens if we gave them a chance. Nearly all of these plants are extremely adaptable and easy to make at home in any ordinary soil or conditions, provided they have good drainage in full sun.

One of the most gorgeous of the prairielings is the wild indigo, *Baptisia*. It is a most striking looking plant and growing as it usually does in wide colonies adds to the impressiveness of its display. The plant is a low mound of stiff stems topped by clean, bright leaves composed of many small oval leaflets growing along either side of the main stem. The flowers are large pea-shaped in tall stiff racemes, of an intense indigo blue and occasionally a clear creamy yellow.

There are from one to nine or ten bloom stems to a plant. The seed pods are quite ornamental, being fat, black capsules, standing stiffly erect on the stem. An insect bores into the pod and eats the seed almost as soon as it

ripens, so that they have to be picked as soon as possible after they are matured.

Talinum calycinum always grows singly or at most but a few in a place, lately it is quite rare. It is a treasure worth being searched for and prized when found. A tuft of short, flashy, finger-like leaves spring from the crown of the pinkish yellow, fleshy root. The flower is a bright rose color filled with golden stamens, seeming to float above the plant, as the stems are so fine and dark that they are nearly invisible. There are many buds in the loose sprays with a number of stems for each well grown plant, so that, though the flowers are short lived, the beautiful display lasts well along through the summer. The talinum is an ideal rock garden plant but it must be watched toward spring as often the winter freezing and thawing of the soil will force the slender wedge-shaped root entirely out of the ground. I found one the other day with but the tip of its toes caught in the soil and sprouts starting clear around the crown.

There is another talinum which grows in the sand rock of the Smoky Hills that is quite worth while, though in no way equal to *T. calycinum*. This talinum is a miniature of *T. calycinum*. The flower is no larger than one petal of the former with the rest of the plant in proportion. These are comparatively plentiful and are often found growing in tight garlands outlining the cracks of the rocks. They are dainty and fairy-like and are a delightful companion for any of the Hen-and-Chickens for they will grow up between and around the fat Hens and their broods and make a most attractive picture. They are so tiny and well behaved that while they self sow pleasantly, where they are contented, there is never any danger of them

crowding even the daintiest of rock plants. This talinum must be grown in little colonies to be appreciated for a single plant is too modest to attract attention.

I at first thought these two talinum were the same plant grown under different conditions but after growing them for years together, with no change in either, I feel sure they are different varieties of the same family. The talinum belong to the Portulacca family, as is easily told by the fleshy foliage.

ALBERTA MAGERS.

Sterling, Kans.

Onions again.

Among the species onions, or better, alliums, flowering in the garden for the first time this year were several from a California nursery deserving a word or two as interesting small plants for the front of the border or the rock garden, perhaps not important plants in themselves, but still of useful diversity.

Quite the most striking was *Allium falcatum*, which had, as its name implies, broad, flat, gray-green leaves that curved like small sickles near the surface of the ground, forming a sharp contrast for the six inch stems, crowned with bright reddish-purple flowers.

In contrast to this was the less robust *Allium Bolanderi* which first sent up narrow, grassy leaves that had almost withered away before the three inch stalks of purplish-red flowers opened. These are dull reddish-purple like the colors found in plums or grapes and fade to pinkish immortelle-like thinness as they age.

Washington, D. C.

Lilium concolor var. *pulchellum* (See page 295)

These lilies were grown from seed given me by Miss Preston in Canada.

They come very readily from seeds, as does the type and the butter yellow one, called by Wilson *Lilium concolor* var. *pulchellum* f. *partheneion*, only that he says the flowers are yellow striped and spotted with black and the ones I grew were a pure unspotted yellow.

The lily pictured in this number may have another subtitle but it looked as follows. The stems are green and smooth and vary in height from fourteen inches to two feet six inches. The leaves were numerous, slender, terminate in a point and are smooth. They are $2\frac{1}{2}$ " long or more and $\frac{1}{4}$ " across. The flower is hairy outside with a little down-like fuzz. The edges of the segment are as if held together by a nob. The flower opens to the sky, is quite starry in shape and the color of chinese lacquer, of an orange scarlet, except for the dark little dots at the centres of the segment. The segments are $2\frac{1}{4}$ " across and $1\frac{1}{4}$ " high. There are five or six flowers to a stem. Some times the marking is very faint. The pistil—is longer than the stamens and the style and stigma are bright orange. The anthers and filaments, too, are the same color as the whole flower. The ovary is light green and twice as long as the style. Some of the flowers are a darker red and some more orange. They have a shiny surface, not a hard shine as the *L. Hansoni*. They have come through the past two winters in good health so their hardiness is quite assured. I grow these lilies on a sloping bank in semi shade, but since my soil is a heavy clay and somewhat limey and since they do thrive here it speaks well for the ease with which they can be grown.

Here again I would like to emphasize the fact that to be successful with lilies one must grow them in quantities and from seed and one must be ever on the lookout for signs of mosaic and then

immediately destroy affected plants. Botrytis is another pest to watch for and is far easier to handle. This is done by cutting off affected leaves and spraying the whole plant with lime sulphur. In our garden the rabbits and the moles are to be reckoned with. The rabbits, I have discovered, have a sweet tooth or a herby one for the buds of lilies about to flower. I circumvent them by spraying the unopened buds with arsenate of lead. The moles I cannot conquer or circumvent. I have tried everything and finally come to the conclusion that by growing great numbers of a few lilies I will always have enough no matter how many these pesky animals undermine in their search for adventure under my lily beds. We catch a few with mole traps, but still they come. This year there are quite a few snakes around and I hope they will eat the moles. Let us hope so.

HELEN M. FOX.

Foxden, Peekskill, N. Y.

Rhododendron micranthum

This might be considered a useful landscape shrub if it belonged to another genus, but as a rhododendron it is a disappointment. It is a distinct outlier, separated geographically and otherwise from its brethren in the genus *Rhododendron* and more like Labrador Tea in appearance. Although it is a Chinese rhododendron, it comes from Northern China, far away from the region where most Chinese rhododendrons occur, and bears little resemblance to the other species. It has one great virtue—hardiness. In fact, Dr. E. H. Wilson said that *R. micranthum* was the only Chinese Rhododendron to prove reliably hardy in the Arnold Arboretum.

The plant is said to grow up to 6 feet high in nature, but I have not seen it over half that height in cultivation,



Lilium concolor pulchellum

perhaps because of the youth of the plants here. The leaves are evergreen and small, being only about $1\frac{1}{2}$ inches long by $\frac{1}{2}$ inch broad. The flowers are very small, being not over $\frac{1}{2}$ inch across, milky white and borne in many-flowered terminal racemes. They are not at all showy and remind one of a *Ledum* or a small *Spiraea* blossom. The plant grows satisfactorily from seed. It is the sole member of the *Micranthum* Series.

Some persons consider this species horrid, while others think it has potentialities as a landscape subject. No broad-leaved evergreen shrub so hardy as this is totally devoid of usefulness. Yet *R. micranthum* is not a shrub for the showy flower garden, and, since we are educated to believe that rhododendrons should be of floral attractiveness, we must judge this species upon a different basis. Time alone will test its value.

C. G. BOWERS.

Maine, N. Y.

Rhododendron minus (See page 287)

Formerly known as *R. punctatum*, this hardy evergreen rhododendron is a late-flowering member of the Carolinianum Series, blooming during the last days of June. *R. minus* stands to *R. carolinianum* in somewhat the same position as that which *R. maximum* occupies with respect to *R. catawbiense*, to cite a more familiar parallel. It is later to bloom, less showy and more restricted to ravines and valleys than its better known relative, the latter being in more open situations. It seems equally hardy, however, and appears to do well in cultivation wherever any of the other hardy rhododendrons will grow. In my tests it has endured 20 degrees below zero uninjured but, like most of the others, sustained some leaf and bud injury at temperatures lower than this.

The name *minus* implies that the plant is small, but this is certainly a misnomer, because it often attains a height of 20 feet and is one of the tallest American species. Moreover, it is said to be the most rapid grower of all American rhododendrons. Seedlings in my "flats" are proving this assertion. It tends somewhat toward a straggly habit of growth, but is not undesirable where a plant of loose character is needed, such as in a wooded or naturalistic setting.

Whether *R. minus* is good or bad depends upon the personal choice of the observer and, much more, upon the discrimination used by the one who plants it. Its flowers are much darker than those of *R. carolinianum*, standing between dark magenta-rose and bright magenta in color. I consider them richer and brighter than the familiar lilac color of *R. catawbiense*. Obviously, this color is more pleasing in a green or woodland setting than when close to architectural features or when combined with other flowers of brighter hues. Its foliage is much like that of *R. carolinianum*, but it has more acuminate leaves, frequently having a slight twist to them. It has 4 to 10 flowers in a cluster and the flowers may be as large as $1\frac{1}{2}$ inches across when fully open, although they are often somewhat smaller. Its time of bloom is an advantage, coming to fill the gap between the last Catawba rhododendrons and the first Maximum flowers. The foliage, of course, is much lighter and finer in texture than that of the catawba and Maximum rhododendrons, thus rendering *R. minus* of some usefulness in places where the thick, leathery leaves of the other species might be considered too heavy or too coarse.

C. G. BOWERS.

Maine, N. Y.



L. A. Guernsey

*Rhododendron minus**Silene Hookeri* (See page 289)

Silene Hookeri, an Indian Pink from Oregon, has flowers of a clear pink shade, unusual in wildflowers. There is nothing muddy or purplish about the color of the wide open, fringed blossoms. The foliage is grayish green and rises two to five inches above the ground. There are numerous stalks if the specimen is an old, well grown one,

and these stalks all spring from a thick fleshy taproot that may be as much as eighteen inches long. The crown of this taproot is some little distance below the surface of the ground, and the stems that radiate from it are weak and slender in their underground portion but become stouter and erect as they emerge from the ground. One plant may appear to be several small ones, but care-

ful digging reveals that all the blooming sections are sprung from a common taproot. Collecting is difficult, as the weak stems are apt to break off and the central root goes straight down in the soil, to a surprising depth.

Collected plants, which are nearly always damaged as to the roots, need to be planted as soon as possible in light, well-drained soil, and given plenty of water at first. The taproot, which somewhat resembles the roots of *Gypsophila paniculata*, will start making new growth, and usually there will be bloom the following spring. The plant is intolerant of poor drainage conditions, and will die if it is in water-logged soil. In much of its natural range it has an abundance of snow and rain during nine months of the year, and probably never does experience total dryness, as it is so deep rooting; though during the summer the surface of the ground is quite dry and the foliage of the plant dries up and disappears after seed is ripened.

In the garden we have noticed it do best in full sunshine, in rocky soil, on a slight slope. In this climate, western Oregon, it is quite hardy, but I cannot say how well it withstands freezing weather in the northeast states.

DREW SHERRARD.

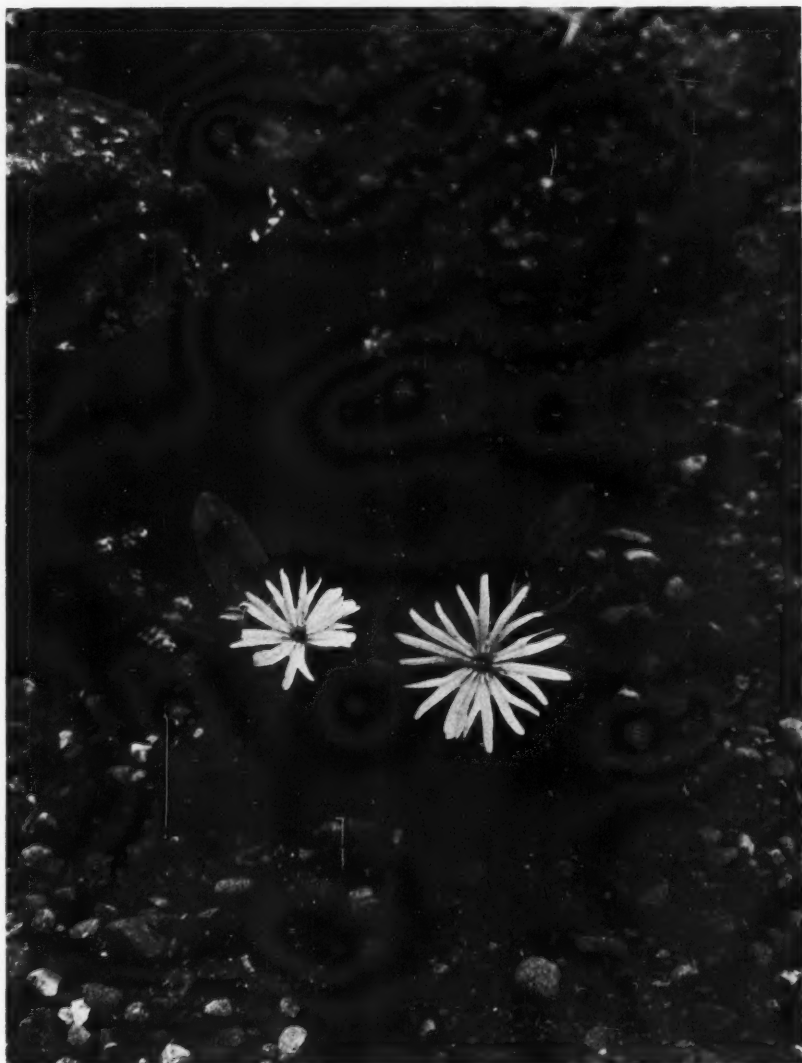
Oswego, Ore.

Cypripedium montanum (See page 290)

Cypripedium montanum, the white lady's slipper, is found growing in open woods, often among oaks and pines, or under shrubs. It is rarely found, at least nowadays, in thick stands, but scattered in little groups; or one may come upon one single plant flourishing where no others can be found for miles. Especially is this true near large towns, for this is a plant which cannot resist civilization, it makes too few seedlings.

Brought into the garden, and given a place where moderate shade and a bed of leafmould are provided, it is very easy to grow. Collected plants need considerable watering the first year, but after they are established, they get on without any attention. In the natural home, in Oregon and Washington forests, they have a dry period of at least two months, and this is the plant's rest time, and the best time for the gardener to divide old plants. Division is a simple enough task, especially if one washes all earth off the roots so as to cut through the crown of the plant cleanly without cutting the long coarse roots. In other words, just as one divides a primrose.

For the average amateur, one may as well say that division is the only method of propagation, for growing this and other orchids from seed is expert work. I know one man who has grown too plants of *C. montanum* from seed, and he tells me he germinated the seed on a piece of bath towel in a pot saucer, keeping the towel moist by means of a cotton wick leading to another saucer filled with water. How many thousand seeds failed to germinate on the cloth he did not state, but as the seeds are as fine as powder, probably there were a good many. There has never been a self sown seedling in our garden, and they are scarce in the natural situation. The plant makes millions of seeds that are not fertile, because its structure makes it strictly insect pollenized. The insects, always alert when any mischief is afoot, seem negligent, at any rate in this garden, about this little duty, so the result is fat seed capsules, filled with worthless fluff. I have tried artificial pollenization, and afterwards sowed the seed around the parent plants, but so far without result. Two reasons may explain this failure: the weeding that is done now and then of

*Drew Sherrard**Silene Hookeri*

necessity, and the fact that though the mature plants are able to flourish in the garden, the surface moisture is not sufficient to favor germination.

The moccasin of this flower is white or creamy, with purplish crimson lines inside, to direct the insect traffic. The petals and sepals vary with individual



Drew Sherrard

Cypripedium montanum

plants from a dark bronze to a yellowish bronze, and I have seen just one that had rich maroon petals and sepals. The height is from six inches to a foot, depending on the vigor of the plant

and other conditions. With us it blooms in April or May, and lasts in flower about three weeks.

DREW SHERRARD.

Oswego, Ore.

